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Roadmap for Institutional and Policy Mainstreaming of Sustainable Land and Ecosystem Management in India



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Indian Council of Forestry Research and Education

The report on "Roadmap for Institutional and Policy Mainstreaming of Sustainable Land and Ecosystem Management in India" is prepared under the World Bank funded Ecosystem Services Improvement Project (ESIP) being implemented by the Indian Council of Forestry Research and Education, Dehradun.

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सत्यमेव जयते

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महानिदेशक
भारतीय वानिकी अनुसंधान एवं शिक्षा परिषद्
डाकघर न्यू फॉरेस्ट, देहरादून-248006
(आई.एस.ओ. 9001:2008 प्रमाणित संस्था)

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(An ISO 9001:2008 Certified Organisation)

Foreword

Land is a vital resource for producing food and providing livelihood to a large number of local communities, especially in the rural and forest fringe areas. Large number of floral and faunal species are extinct in the past decades due to land degradation and overexploitation of natural resources. Desertification and land degradation along with climate change and biodiversity loss were identified as the greatest challenges to sustainable development. Sustainable land and ecosystem management can help and facilitate conservation of forests, biodiversity, natural resources, and restoration of degraded lands thus improving carbon sinks.

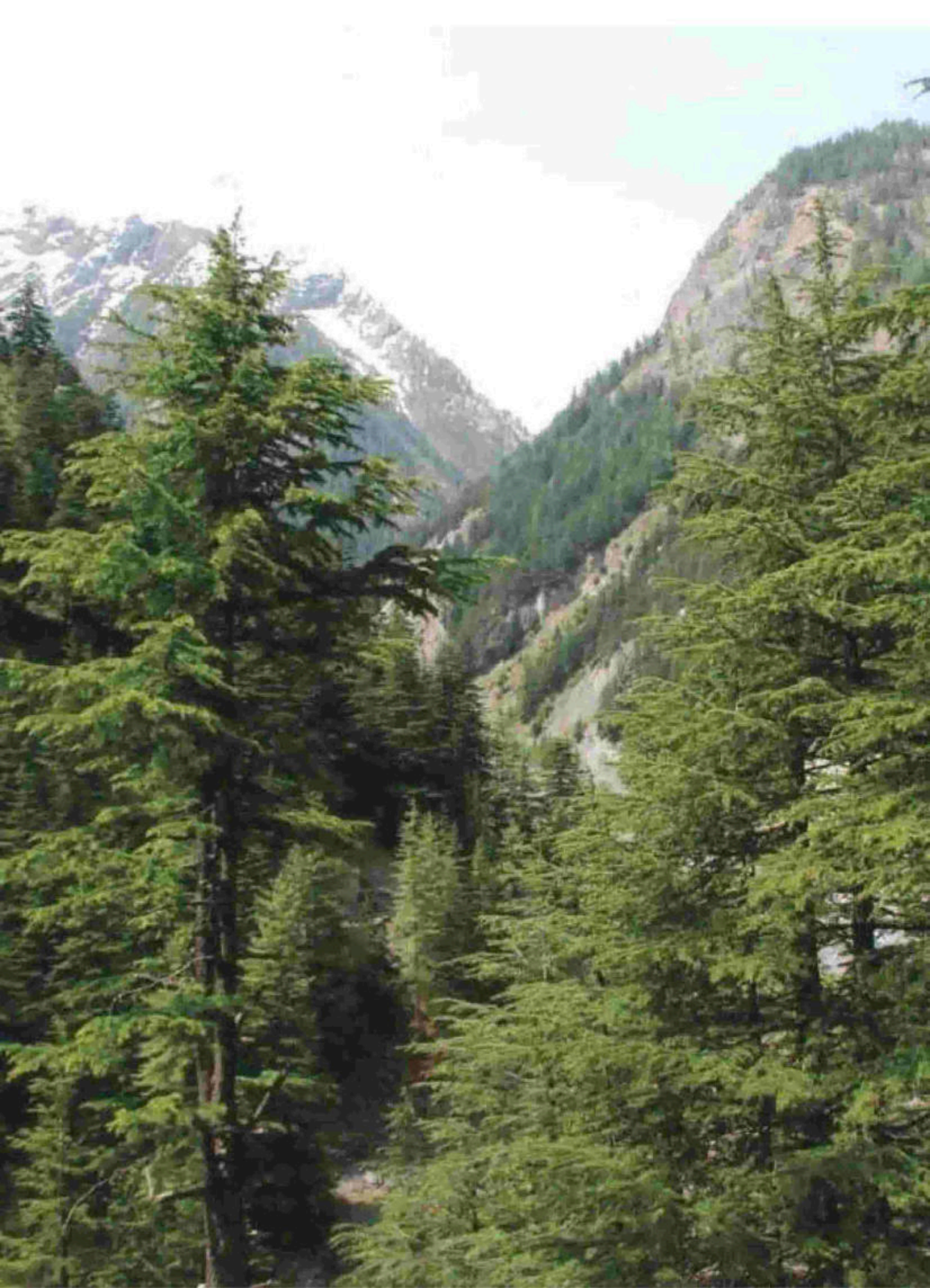
India is the seventh largest country in the world having total geographic area of 328.73 mha, which occupies only 2.4% of the world's geographical area, however it supports about 18% of the world's human and cattle population. Dry lands areas in India are about 228.3 mha which is 69.6% of the total geographical area, and comprises of arid lands, semi-arid land and dry sub-humid areas. The extent of land degradation is estimated to be 97.85 mha covering 29.77% of the geographical area of the country. There are numerous factors contributing to land degradation in India. An ever increasing human and cattle population have enormous demands on land which has led to drastic changes in the proportion of land utilized for agricultural activities, urbanization and industrial development. Issues such as human and animal pressure on land, over-exploitation of soil and water resources, unscientific land use, climate change resulting in natural calamities like drought and floods are major factors responsible for land degradation in India. The Hon'ble Prime Minister of India while addressing the High-Level Segment of Fourteenth Conference of Parties to United Nations Convention to Combat Desertification in 2019 made an announcement to set up a Centre of Excellence on Sustainable Land Management at Indian Council of Forestry Research and Education in order to further develop scientific approach and facilitate induction of technology on land degradation issues.

It is required to know the current state of institutional and policy arrangements in India, identify key gaps and how these may be required to be realigned to mainstream sustainable land and ecosystem management (SLEM) practices in making investments choices etc. ICFRE has developed a road map for institutional and policy mainstreaming of SLEM in India under the World Bank funded Ecosystem Services Improvement Project. This roadmap has provided specific guidelines to different Ministries/ Departments/ Research Organizations/ Civil Society Originations involved in restoration of degraded lands and to combat land degradation and desertification. The roadmap also provided the guidelines and action plans for achieving Land Degradation Neutrality, Sustainable Development Goals and Nationally Determined Contribution targets of India.

I congratulate Project Director and entire team of Ecosystem Services Improvement Project and team of M/s Ernst & Young LLP for their efforts in bringing out a roadmap for institutional and policy mainstreaming of SLEM in India. I am certain that guidelines and action plans given in this roadmap will be useful in mainstreaming of SLEM in India and in combating desertification and land degradation in India.

Dated: 03 October 2022

(Arun Singh Rawat)





सत्यमेव जयते

कंचन देवी, भा.व.रो.
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निदेशक, (अंतर्राष्ट्रीय सहयोग) एवं
परियोजना निदेशक ई.एस.आई.पी.
भारतीय वानिकी अनुसंधान एवं शिक्षा परिषद
डाकघर न्यू फॉरेस्ट, देहरादून-248006
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Preface

The Government of India is implementing the World Bank/ GEF funded Ecosystem Services Improvement Project (ESIP). ICFRE is one of the project implementing agencies and implementing one of the components of the project, i.e., scaling up sustainable land and ecosystem management (SLEM). The main objectives of this component are to prevent land degradation and desertification and increase above-ground forest carbon stock through a combination of investments to scale-up tried-and-tested SLEM best practices, to increase national capacity for monitoring land degradation and track associated indicators, and to generate knowledge exchange on SLEM approaches. The goal is to develop a national knowledge platform for supporting a community of practice on SLEM. These activities are designed to overcome the twin challenges of arresting land degradation and meeting the national targets and international commitments. As a part of the ESIP, ICFRE has engaged M/s Ernst & Young LLP as a consultant to prepare a "Roadmap for Institutional and Policy Mainstreaming of Sustainable Land and Ecosystem Management in India". The SLEM road map provided specific guideline to different Ministries/ Departments/ Research Organizations/ Civil Society Originations involved in restoration of degraded lands and to combat desertification. The road map also provides the guidelines and plans for achieving the targets of land degradation neutrality, sustainable development goals and NDC targets of India.

Financial support provided by the World Bank for Ecosystem Services Improvement Project is gratefully acknowledged. Necessary direction and guidance provided by Sh. Arun Singh Rawat, Director General, ICFRE and Dr. Anupam Joshi, Team Task Leader, ESIP, the World Bank for conducting this study under ESIP are gratefully acknowledged.

Various kind of supports provided by Smt. Uma Devi, Former Additional Secretary, Sh. PK. Jha, Inspector General of Forests, National Afforestation and Eco-Development Board, Sh. Anand Prabhakar, Dy. Inspector General of Forests, other officers and consultants of Green India Mission Division, Ministry of Environment, Forest and Climate Change, Govt. of India for this study are gratefully acknowledged. Inputs provided by Sh. Anurag Bhardwaj, Former Director (IC) & Project Director (ESIP), ICFRE is also gratefully acknowledged.

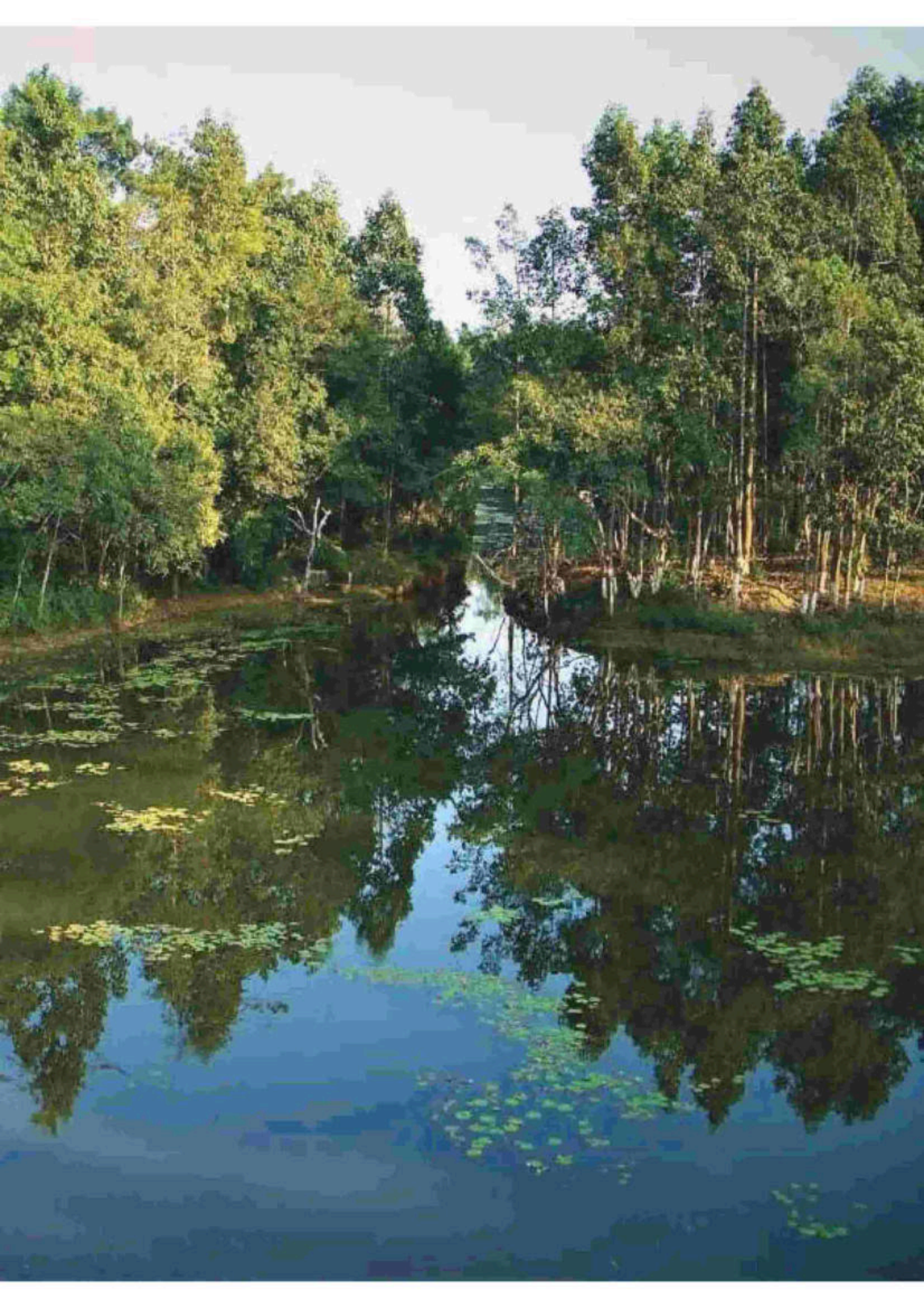
Contribution made by Dr. R.S. Rawat, Project Manager, ESIP for conducting this study and editing & finalizing the SLEM roadmap is also gratefully acknowledged.

I am thankful to all the team members led by Sh. Amit Kumar, Associate Partner, Ernst & Young LLP in conducting this study and preparation of the final report.

I compliment the team of scientists and consultants of Ecosystem Services Improvement Project, Biodiversity and Climate Change Division of ICFRE Hqs. for editing the final report of the study submitted by M/s Ernst & Young LLP.

Dated: 03 October 2022

(Kanchan Devi)





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Abbreviations Used

ABS	Access and Benefit Sharing
ADC	Autonomous District Council
AFOLU	Agriculture, Forestry and Other Land Uses
ARC	Autonomous Regional Council
BAU	Business as Usual
BD Act	Biodiversity Act
BMC	Biodiversity Management Committee
BMZ	German Federal Ministry for Economic Cooperation and Development
BUR	Biennial Update Report
CAFRI	Central Agroforestry Research Institute
CAGR	Compound Annual Growth Rate
CAMPA	Compensatory Afforestation Fund Management and Planning Authority
CAPART	Council for Advancements of People's Action and Rural Technology
CAZRI	Central Arid Zone Research Institute
CBD	Convention on Biological Diversity
CCARI	Central Coastal Agricultural Research Institute
CFRMC	Community Forest Resource Management Committee
CFR	Community Forest Resource Rights
CGWB	Central Ground Water Board
CNT	Chota Nagpur Tenancy Act, 1908
CoE	Centre of Excellence
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide equivalent
CPCB	Central Pollution Control Board
CPP	Country Partnership Programme



CPR	Common Property Resources
CPT	Candidate Plus Trees
CRIDA	Central Research Institute of Dryland Agriculture
CSR	Corporate Social Responsibility
CSSRI	Central Soil Salinity Research Institute
CWMI	Composite Water Management Index
DAC	Development Assistance Committee
DAY-NRLM	Deendayal Antyodaya Yojna - National Rural Livelihoods Mission
DDP	Desert Development Project
DILRMP	Digital India Land Records Modernization Programme
DIP	District Irrigation Plan
DMF	District Mineral Foundation
DoLR	Department of Land Resources
DPAP	Drought Prone Area Programme
DPC	District Planning Committees
DWR	Directorate of Weed Research
EAS	Employment Assurance Scheme
EbA	Ecosystem-based Adaptation
EC	Environmental Clearance
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environment (Protection) Act 1986
ESIP	Ecosystem Services Improvement Project
FAO	Food and Agricultural Organization
FC	Forest Clearance
FDA	Forest Development Agency



FDST	Forest Dwelling Scheduled Tribes
FFV	Forest Fringe Village
FLR	Forest Landscape Restoration
FRA	Forest Rights Act 2006
FR CER	Forest Research Centre for Eco-Rehabilitation
FRI	Forest Research Institute
GDP	Gross Domestic Products
GEF	Global Environment Facility
GHG	Greenhouse Gas
GIM	Green India Mission
GIS	Geographic Information System
GP	Gram Panchayat
GPDP	Gram Panchayat Development Plan
GT	Giga Tonne
GVA	Gross Value Added
HDI	Human Development Index
ICAR	Indian Council of Agricultural Research
ICAR RCER	ICAR Research Complex for Eastern Region
ICAR RCNEH	ICAR Research Complex for North Eastern Hill Region
ICFRE	Indian Council of Forestry Research and Education
IFAD	International Fund for Agricultural Development
IFB	Institute of Forest Biodiversity
IFGTB	Institute of Forest Genetics and Tree Breeding
IGWDP	Indo German Watershed Development Programme
IWMP	Integrated Watershed Management Programme
IIFM	Indian Institute of Forest Management



IIFSR	Indian Institute of Farming System Research
IISS	Indian Institute of Soil Sciences
IISWC	Indian Institute of Soil and Water Conservation
IIBM	Indian Institute of Water Management
IMD	Indian Metrological Department
INM	Integrated Nutrients Management
IPM	Integrated Pest Management
ISFR	India State of Forest Report
ISPWDC	Indo Swiss Participatory Watershed Development Programme
ISRO	Indian Space Research Organization
IWMP	Integrated Watershed Management Programme
IWST	Institute of Wood Science and Technology
JFM	Joint Forest Management
JFMC	Joint Forest Management Committee
JHADC	Jaintia Hills Autonomous District Council
LULUCF	Land Use, Land-Use Change and Forestry
LDN	Land Degradation Neutrality
MDF	Moderately Dense Forest
MEA	Multilateral Environment Agreements
MFP	Minor Forest Produce
MGIFRI	Mahatma Gandhi Integrated Farming Research Institute
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MKSP	Mahila Kisan Sashaktikaran Pariyojna
MoAFW	Ministry of Agriculture and Farmer Welfare
MoEFCC	Ministry of Environment, Forest and Climate Change



MoJS	Ministry of Jal Shakti
MoPR	Ministry of Panchayati Raj
MoRD	Ministry of Rural Development
MoRTH	Ministry of Road Transport and Highways
MoTA	Ministry of Tribal Affairs
NAAS	National Academy of Agricultural Sciences
NABARD	National Bank for Agriculture and Rural Development
NAP	National Agriculture Policy 2000
NAPCC	National Action Plan on Climate Change
NBA	National Biodiversity Authority
NBAP	National Biodiversity Action Plan 2008
NBSS&LUP	National Bureau of Soil Survey and Land Use Planning
NCSPS	National Conservation Strategy and Policy Statement on Environment and Development 1992
NDC	Nationally Determined Contributions
NEP	National Environment Policy 2006
NFP	National Forest Policy 1988
NGO	Non-Governmental Organization
NGT	National Green Tribunal
NHAI	National Highways Authority of India
NIASM	National Institute of Abiotic Stress Management
NIF	National Indicator Framework
NIH	National Institute of Hydrology
NIRD&PR	National Institute on Rural Development and Panchayati Raj
NLCB	National Land Use and Conservation Board
NPF	National Policy for Farmers 2007



NRAA	National Rainfed Area Authority
NREP	National Rural Employment Programme
NRLM	National Rural Livelihood Mission
NRM	Natural Resource Management
NRSC	National Remote Sensing Centre
NSC	National Seeds Corporation
NTFP	Non-Timber Forest Produce
NTP	National Tourism Policy 2002
NWDB	National Wasteland Development Board
NWDPRA	National Watershed Development Project for Rainfed Areas
NWF	National Water Framework
NWP	National Water Policy 2012
OECD	Organization for Economic Co-operation and Development
OTFD	Other Traditional Forest Dwellers
PBR	People's Biodiversity Register
PESA	Panchayats (Extension to the Scheduled Areas) Act 1996
PIA	Project Implementation Agency
PMKKKY	Pradhan Mantri Khanij Kshetra Kalyan Yojna
PMKSY	Pradhan Mantri Krishi Sinchai Yojana
PPC	People's Plan Campaign
PSAP	Policy Statement for Abatement of Pollution 1992
PSIP	Planting Stock Improvement Programme
PWD	Public Works Department
RFA	Recorded Forest Area
RFCTLARRA	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act 2013



RKVY	Rashtriya Krishi Vikas Yojana
RLEGP	Rural Landless Employment Guarantee Programme
ROAM	Restoration Opportunities Assessment Methodology
RS	Remote Sensing
SAC	Space Applications Center
SBB	State Biodiversity Board
SDG	Sustainable Development Goal
SEZ	Special Economic Zone
SFCI	State Farms Corporation of India
SHG	Self-Help Group
SLEM	Sustainable Land and Ecosystems Management
SLM	Sustainable Land Management
SLUB	State Land Use Boards
SMMG	Sand Mining Management Guidelines
SOC	Soil Organic Carbon
SOPs	Standard Operating Procedures
TA	Technical Assistance
TGA	Total Geographic Area
TOF	Tree Outside Forests
TSG	Technical Support Group
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UTs	Union Territories
WDC	Watershed Development Corporation
WUA	Water User Association
WII	Wildlife Institute of India

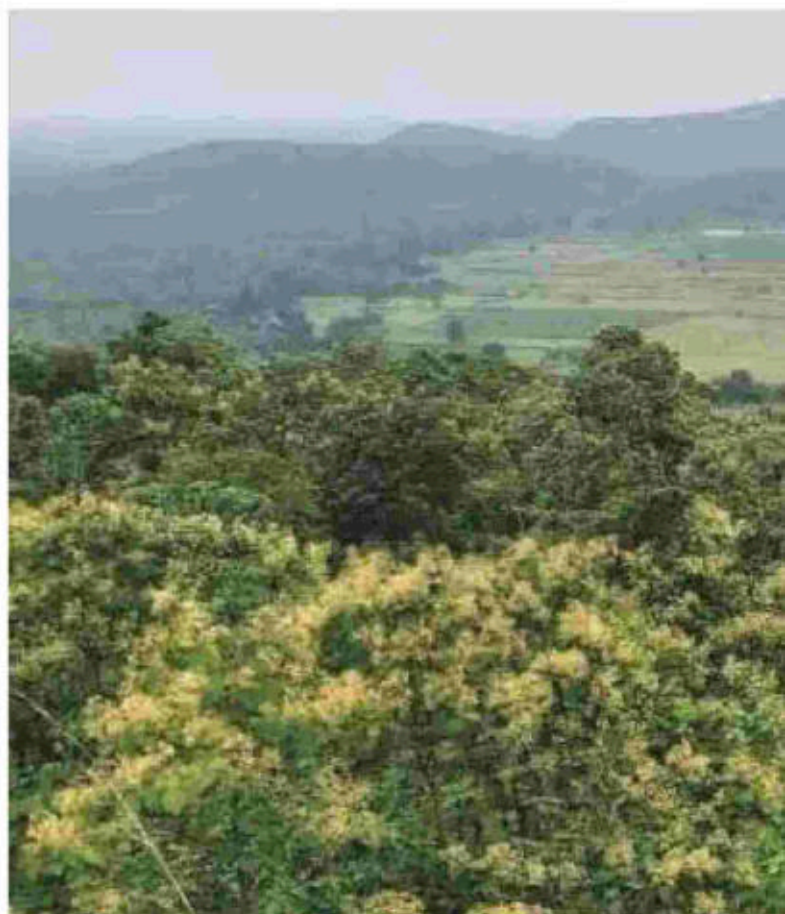


Executive Summary

Land degradation, commonly understood as the diminution in land's natural capacity to perform essential ecosystem functions and services, is a key global challenge, including in India. It has serious ramifications for agriculture-based economies like India, where the economic emancipation of a substantial segment of the population is closely linked with land resources. Nearly 29.77% of India is impacted by desertification and land degradation. Water induced erosion is responsible for 37% while vegetation degradation is causing 30% of the total land degradation. Wind erosion, salinity and frost shattering contribute 18%, 4% & 3%, respectively to the cause.

Sustainable land management (SLM) is a globally acknowledged approach to address all aspects of land use and its sustainable management. SLM was defined at the Rio Earth Summit in 1992 as *"the use of land resources, including soils, water, animals and plants, for the production of goods to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions"*¹. Over three decades, SLM has shaped the approaches to address land degradation through various programmes, including watershed and landscape-based approaches in India. In addition, country-specific approaches such as Forest Land Restoration (FLR) and Restoration Opportunity Assessment Methodology (ROAM) are also understood to provide a conceptual framework for agencies involved in addressing land degradation.

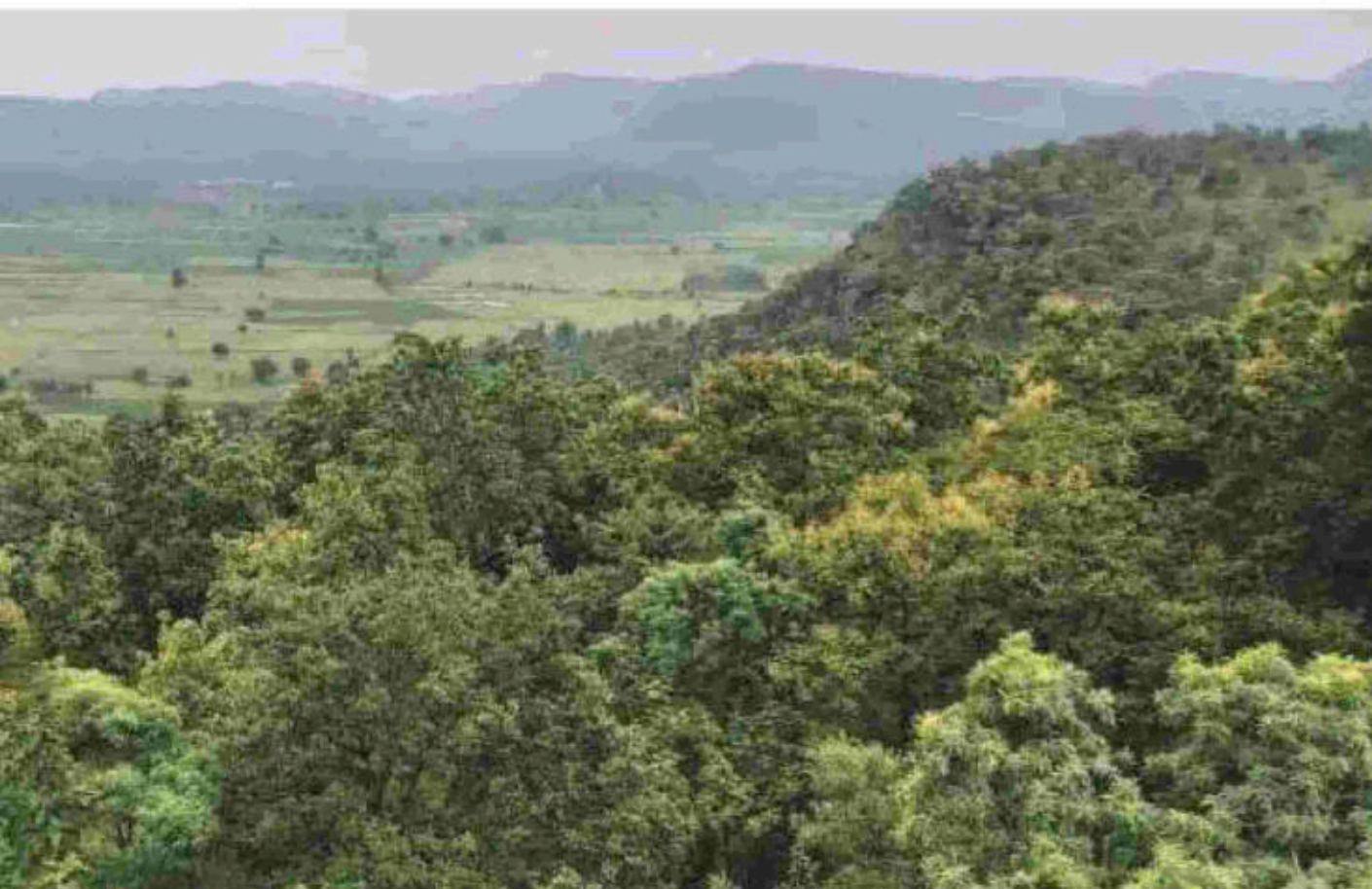
Sustainable Land and Ecosystem Management (SLEM) started in India as a joint initiative of the Government of India



and Global Environment Facility (GEF) under the GEF Country Partnership Programme (CPP). The programme's objective was to promote sustainable land management, use of biodiversity and maintain the capacities of ecosystem services while considering climate change. The Desertification Cell under the Ministry of Environment, Forest and Climate Change (MoEFCC) was the National Nodal Point for SLEM programmatic approach, while the Indian Council of Forestry Research and Education (ICFRE), Dehradun, was the technical facilitation organization for the SLEM programme. As part of the project, a SLEM baseline report was prepared by ICFRE, which also documents key action areas for achieving SLEM.

The baseline study highlighted that mainstreaming and scaling up of SLEM requires a Road Map and Action Plan to minimize the

¹ <https://knowledge.unccd.int/knowledge-products-and-pillars/best-practices-sustainable-land-management>



policy and institutional gaps and guide the harmonization of efforts by various policies, programmes and institutions at the national and sub-national level. Accordingly, based on a comprehensive methodology, a multi-stakeholder engagement-based approach has been taken for preparation of the Road Map for Institutional and Policy Mainstreaming of SLEM India.

Goal for the Roadmap for Institutionalizing SLEM

- (i) Government departments/ agencies understand the implication of their policy and programmatic actions on sustainable land and ecosystem management.
- (ii) They are able to address concerns related to sustainable land and ecosystem management

while making policies and programmes.

- (iii) Enablers i.e., relevant data, science-based understanding and costs implications for action or inaction are established to support agencies in decisionmaking.
- (iv) Adequate actions in proportion to the intensity of the problem are taken to address the challenges due to land and ecosystem degradation through committed resources and coordinated interventions.
- (v) Knowledge and know how regarding sustainable land and ecosystem management is widely available in easily accessible mode to all stakeholders.



Land Governance in India Impacting SLEM

The Constitution of India delineates the legislative competence of the Parliament and State legislatures regarding subject matters, including land and natural resources. 'Land' was identified as a State subject, and 'Forests' a Concurrent subject under the Constitution. Non-forest land is exclusively within the legislative and administrative domain of the state government. The Central legislation on regulation, improvement and reforms in non-forest land is absent. There is, however, a plethora of legislation and revenue codes dealing with non-forest land at the state level, including the ceiling and tenancy laws.

The role and responsibilities of Village Panchayats under the Constitution are far more direct and elaborate concerning land and natural resource management. Panchayats could contribute to SLEM if the state legislature empowers them to regulate, manage and prepare plans and implement schemes with respect to agriculture, land improvement, land reforms, land consolidation, soil conservation, water management, watershed development, social and farm forestry, fisheries, minor forest produce, fodder, fuel, and community assets among others.

The decentralized forest and scheduled areas governance in the country is guided by the Fifth and the Sixth Schedule of the Constitution, the provisions of Panchayat Extension to the Scheduled Areas (PESA) Act, 1996 and the Scheduled Tribes and Other Traditional Forest Dwellers Recognition of Forest Rights Act, 2006. The Sixth Schedule pertains to the four North Eastern States of Assam, Meghalaya, Tripura and Mizoram and recognizes tribal customary rights over land and other natural resources.

The PESA provides certain exclusive powers to Gram Sabha to approve developmental plans and projects, beneficiary selection for poverty alleviation programmes

and granting utilization certificates for the programmes implemented by the Panchayat. PESA also provides for the Gram Sabha or Panchayat at appropriate level to be consulted before land acquisition for development projects and rehabilitation of persons affected by projects as well as prior recommendation of the Gram Sabha or Panchayat for granting of prospecting licence or mining leases for minor minerals and for granting of concessions for the exploitation of minor minerals by auction.

Different states have attempted harmonizing the state Panchayat law with the spirit and provisions of PESA. For example, the Orissa Scheduled Areas Transfer of Immovable Property (By Scheduled Tribes) Regulation, 1956, under its 2002 amendment, entirely bans the transfer of immovable property (land) of Scheduled Tribes to non-tribal in the Scheduled Areas. However, the progress is not similar across the country.

Due to the special constitutional and legal position, the control and management of natural resources in the North Eastern Region of India are governed by the three sets of legal and policy instruments that empower institutions at the regional, state and local/ autonomous district level. However, natural resources are primarily controlled and governed under the customary laws by the local institutions recognized by the Autonomous District Councils in the four states of Assam, Meghalaya, Mizoram and Tripura and Village Councils in Nagaland and Manipur at the hill district level.

Further, two streams of laws regulate land and its resources in India. While considerable attention was paid to legal reforms aimed at redistributing land as part of social justice post-independence, a similar focus has not been paid to ensure its sustainability. Land acquisition and ceiling laws were mobilized to acquire, redistribute and vest land either with the government or the landless while the planned land use and sustainable management have lagged. Alternatively, land and soil sustainability issues have been attempted through institutional response, which has created a limited impact, especially



at the implementation level in the states due to the non-statutory nature of the State Land Use Boards (SLUBs) that lacks legal or financial autonomy.

The two major land reforms approach to consolidate agricultural lands comprise land ceiling and tenancy regulations. The States' tenancy and land ceiling laws are closely linked to land governance and are thus relevant to SLEM objectives.

Policy Imperatives for Actioning SLEM in India

In addition to land ownership, a number of policy instruments on natural resource management with direct or indirect implications on land are also central to SLEM. Overall, following thirteen policies have been identified which have a bearing on SLEM in the country:

- | | |
|---|--|
| <ul style="list-style-type: none"> • National Forest Policy, 1988 • The National Conservation Strategy and the Policy Statement on Environment and Development, 1992 • The Policy Statement for Abatement of Pollution (PSAP), 1992 • National Environment Policy, 2006 • The National Biodiversity Action Plan, 2008 and the Addendum to the NBAP, 2014 • National Agriculture Policy, 2000 • National Policy for Farmers, 2007 • National Agroforestry Policy, 2014 • The National Water Policy, 2012 • Fertilizer Policy | <ul style="list-style-type: none"> • National Biofuel Policy, 2018 • National Mineral Policy, 2019 • National Tourism Policy, 2002 • The Environment (Protection) Act, 1986 • The Provisions of the Panchayats (Extension to Scheduled Areas) Act- PESA, 1996 • The Biodiversity Act, 2002 • MGNREGA, 2005 • The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, also known as Forest Rights Act (FRA) • CAMPA Act, 2016 • Regulations for Felling of Trees |
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Collectively, these policies attempt to advance the sustainable management of the country's natural assets and minimize the developmental and pollution impacts on resources. For example, the National Forest Policy, 1988 is a target driven policy and has a number of progressive elements, including the participation of communities for sustainable forest land management and promotion of agroforestry. Similarly, the policy statements on the environment, abatement of pollution and the National Environment Policy argue for minimizing the impact of pollution on land through strategies such as locating polluting industries in specified zones. The water policies adopted and revised many times attempts to mainstream integrated water resources management and conservation.

However, despite the existing framework of policies, achieving sustainable land management and tackling land

degradation and its impact on ecosystems security has emerged as one of the key challenges in India. Many of the policies and programmes concerning the environment and sustainable resource management were initiated nearly three decades ago but they have not been able to arrest the degradation of agricultural, forest, common and government lands. The generic nature of policy imperatives with limited or no institutional mechanisms for the implementation of policy directions is realized as one of the major constraints for the non-performance of policies. The natural resource management (NRM) related policies applicable to sustainable land and ecosystem management capture the major problem areas but fall short of addressing the socio-economic drivers that cause or explain land degradation.

In the agriculture space, the existing policies collectively too, do not address the need for rationalizing prevalent



input subsidies to lands such as on fertilizer and electricity and decreasing per capita land - the two fundamental causes of agricultural land degradation in most parts of the country. For example, the extension of agriculture to low potential lands and failure of irrigation systems resulting in diminished outputs, overuse of groundwater, and diminishing soil health have not been under policy scrutiny. Similarly, using natural forest ecosystems for agricultural extension under 'shifting cultivation' in many States could not be contained through policy prescriptions.

Cost benefit analysis is often used as an effective tool while assessing various options. For SLEM related policies it is more pertinent that the analysis considers the cost of inaction or not doing enough. Even when scientific institutions and experts have come out with costs and benefits of policy actions, the translation of the knowledge into policy has been weak. For example, incentives or role of non-government institutions has not been sufficiently explored under the current NRM related policies. In effect, the policies have focussed on proximate causes of natural resources degradation and offer a generic outline of interventions while failing to adequately address the interrelationships of various drivers.

Green accounting is another method of mainstreaming the impact of economic development on the environment and the health of people. The typical problem of accounting has been under discussion globally since the 1980s. The UN Statistical Commission had developed a Framework for Development of Environment Statistics called FDES in 1984. The natural capital accounting framework has been subsequently revised, and the System of Environmental Economic Accounting 2012 (SEEA) Central Framework (UN, 2014) was brought out in 2014. The framework prescribes the methodology to capture the increase in economic products as well as the increase or decrease of the natural capital to give an overall view of the economic, social and environmental development. However, green accounting has not become a norm due to challenges related to attributing monetary value to the stock of the ecosystem services provided by nature.

Role of Institutions in Implementing SLEM

Institutions play a pivotal role in policy formulation, programme planning and implementation. The structure of institutions, knowledge, skills, finance, human resources at their disposal, the intra-relations within an institutional structure and interrelations with other institutions, and their autonomy in decision-making determine the effectiveness to deliver.

Analysis of the institutional structures at the Centre, State, District and Sub-district, including the Gram Panchayat, suggests the absence of a dedicated and specialized nodal institution at the state level that looks at land management in totality. The District Collector/ District Magistrate (DC/ DM) has been the fulcrum of all government programmes and the focal person around whom the interdepartmental coordination and planning revolves. However, the DC/ DM being the presiding authority on the score of laws and District level committee, it is not individually possible for him to provide detailed guidance or oversight in holistic planning on all the schemes, including in areas related to land management, degradation and environment. An institution at the next level is required to support the DC/ DM to increase the effectiveness of his office in this aspect.

At the district and block level, the staff mainly focus on implementation. This is also the most important level for inter-departmental coordination. However due to the vertical structure of the line departments, in programmes where joint implementation is required in the same landscape, coordination is difficult to achieve beyond the department where the programme is housed. Often, district level officials are not used to having a holistic view of the sector beyond the targets they need to achieve. In cases where district plans have been made, they have mainly remained of theoretical value due to the huge gap between resources demanded in the plan vis-a-vis the actual resources available, resulting in redundant plans.

Many Central sector/ Centrally-sponsored schemes have set up district-level units as part of scheme implementation



with few dedicated staff, but they are inadequate or not empowered enough to effect interdepartmental or intersectoral coordination. Limitation on administrative expenses at times becomes an important factor in programmes determining the adequacy of technical staff. Wherever programmes are suffering due to manpower limitations, the proportion of money allowed for administrative expenses might require upward revision.

Staff strength often falls short at the Gram Panchayat (GP) level, given that the responsibility and involvement of GPs are envisaged in most programmes. In addition, the planning and managerial capabilities of staff allotted to GPs is very weak. There is hardly or no reporting relationship of the line departments with GPs, so they are mostly not aware of the plans of individual departments or are made aware at a much later stage for formality purposes. Development imperatives demand higher skills from functionaries at the Panchayat level for holistic and multi-sectoral planning, while considering demographics and socio-economic factors in mind. A dedicated technical team with the backing of technology-based tools is a requirement at the GP level. The non-separation of executive and governance functions at the GP level has reduced the GPs as an executing arm of the government machinery or a contractor, which creates impediments wherever governance functions of the GP is to be exercised, for example, in areas such as maintaining equity, distribution and access of resources, planning, building consensus and conflict resolution. Devolutions in terms of funds and functionaries continue to be a work in progress.

Social Aspects Critical to SLEM

Land is a critical resource for supporting the livelihoods of most people living in the rural areas, and the access to land and allied resources is mediated not only by the economic positions of people but also by caste, gender, ethnicity, geographies and culture. Social aspects, therefore, are of primary concern in sustainable land and

ecosystem management. Reduction of poverty and inequality are also key objectives of SLEM. Understanding the contribution and role of people in SLEM is important to engage them in the conservation and management of land, water and forest resources.

Policies, legislation and programmes have included and advanced the needs and interests of the rural communities and vulnerable groups on the aspects of equity, gender mainstreaming, livelihoods, traditional and indigenous practices, development and management of common property resources, and community rights and management of forests and biodiversity in the tribal regions. Continued emphasis has been given to community engagement in planning and programme implementation as well as in building capacities for playing their role. There are several schemes that combine livelihoods with sustainable management of resources. There are also legal provisions to provide the communities ownership and management of resources they have held traditionally. Various institutions such as Joint Forest Management Committees (JFMCs), Self-Help Groups (SHGs), Watershed Committees and Water Users Associations (WUA) have been created as part of these programmes which are the primary organizations through which communities can take care of their resource and sustainability needs.

Despite the above developments over the last couple of decades, critical gaps still exist. For example, meaningful participation of the community in planning and implementation is still a challenge, and gender concerns are neither adequately articulated nor identified in sector programmes. Reporting systems do not provide gender-segregated data, and therefore it becomes difficult to understand how women benefit from the programmes. There is little attempt to meet the needs of women in different sectors, such as agriculture and forest, and women's involvement in programmatic decision-making is not sufficiently addressed.

While the poor communities often shoulder the blame for unsustainable use of natural resources, there is a lack of



initiative to educate people or assist them with technology and knowledge to use resources sustainably or provide alternatives. For example, enabling marginal women farmers and landless women through collectives and federations as well as getting them tenure rights to own and cultivate land is one of the gap areas affecting poor women. The slow and inadequate implementation of the rights provided based legislations to ensure equity and ownership of resources has prolonged the timeline for the tribal communities to benefit from them. It is important to note that people's perspective changes when they see themselves as managers and contributors instead of being only users and exploiters of resources. Providing community ownership of resources, transparency in programme implementation, and active deliberation and participatory decision-making are foundations to community engagement and enhance the community's capabilities in managing natural resources.

Public Investments in Land Management in India

Significant public investments have been made towards addressing land degradation and ecosystem management in the country in the form of schemes and programmes of the Central and state governments. Data suggests that the budgetary contribution of Central and state governments schemes pertinent to SLEM has been in the range of Rs. 700 billion to Rs. 836 billion between 2016-17 and 2019-20 which may be a conservative value given constraints in data availability.

Out of the total funding, the contribution of Central Government programmes was 68.5%, while the rest was the contribution of the states. For example, the forestry sector budget of MoEFCC and the State Forest Departments contribute around a quarter of the total funding for SLEM related programmes. The funds are spent primarily through schemes implemented by multiple departments across the states, i.e. Forests, Agriculture, Watershed, Soil Conservation, Irrigation, Water Resources and Rural Development. However, the tendency of the departments to work in silos constrains optimal use of funds.

Prioritization of Monitoring Indicators

ICFRE had formulated 32 indicators-based monitoring system developed through stakeholder consultation for reporting to the United Nations Convention to Combat Desertification (UNCCD) under SLEM-CPP. The National Indicator Framework developed by NITI Aayog for tracking SDGs are also relevant for monitoring SLEM at a higher level.

Implementation of the UNCCD reporting framework involves identification of the primary stakeholders for reporting across ministries and departments in the Government of India, namely MoEFCC, Ministry of Rural Development (MoRD), Ministry of Jal Shakti (MoJS), Ministry of Agriculture and Farmers Welfare (MoAFW) and their subordinate organizations, finalizing definition of hotspots/brightspots in the context of land degradation for focussed monitoring and reporting by the nodal reporting authority and concerned institutions, fixing targets for various stakeholders and cascading the same to subordinate units and compiling data related to restoration of degraded land from the various stakeholders.

India's Target for Land Degradation Neutrality

As part of the Land Degradation Neutrality (LDN) target, India has committed to restore 26 Mha of degraded land by 2030. This implies an increase in commitment from 21 Mha to 26 Mha from India's earlier Bonn Challenge target announced in 2015.

As per reports, 9.8 Mha has been restored between 2011 and 2018 and the remaining 15 Mha to 16 Mha is expected to be covered by 2030. However, given that unprecedented pressures on land continue and are expected to intensify in the coming years due to rising population and increasing economic activity, there could be many challenges in achieving this target. The 'Business as Usual' approach may not be the best approach to tackle LDN in the country.

Addressing gaps in actionable data and technology to identify and restore degraded land, bridge institutional and funding gaps, and develop an enabling ecosystem for all stakeholders to contribute will be important in achieving the target and beyond.



SLEM in the Context of Sustainable Development Goals

Actions under SLEM contribute directly to achieve Sustainable Development Goals (SDG) 15: Life on Land and indirectly supports the achievement of other SDGs such as SDG 1- No Poverty, SDG: 2 -Zero Hunger, SDG 5- Gender Equality, SDG 10- Reduced Inequality, SDG 12- Responsible Production and Consumption and SDG 13- Climate Action.

SDGs can become an important enabling framework for concerted action as the target setting, and monitoring mechanism can enable more holistic action across the multi-sectoral and multidisciplinary dimensions of SLEM. While identification of key indicators and targets vis-a-vis benchmark levels have already been accomplished, the focus must be shifted to implementation of the various strategies for achieving SLEM and thereafter tracking the achievements against the targets. Three critical sets of actions are required to move towards the next stage of implementation of SDGs - identifying resource gaps, cascading state-level targets to implementation level targets and developing systems to capture performance data for monitoring.

SLEM in the Context of Nationally Determined Contributions Towards Reducing Greenhouse Gas Emissions

Nationally Determined Contributions (NDCs) are at the heart of the Paris Agreement. India submitted its NDC to United Nations Framework Convention on Climate Change (UNFCCC) on 2 October 2016. Among other things, the NDC commits to create an additional carbon sink of 2.5 to 3 billion tonnes of CO₂ equivalent through additional forest and tree cover by 2030.

Between 2010 and 2014, India's emissions have increased at a Compound Annual Growth Rate (CAGR) of

5% compared to a 7% CAGR of the national GDP (at constant 2011-12 prices). As per India's third Biennial Update Report (BUR), about 12% of the country's emissions were offset by the carbon sink action of forests, cropland and settlements. SLEM would play an important role in additions to the carbon sink as well as in avoiding emissions due to land use and land use change.

The forest cover data between the Indian State of Forest Report (ISFR) 2019 and 2021 suggest that there has been an overall increase in the forest cover area of the country. It can however be implied from work done by the Forest Survey of India (FSI) that if the NDC target is not above the "Business as Usual" (BAU) level in 2030 (i.e. 2.5 to 3 GT above 31.87 GTCO_{2e}) then the increase in carbon sink by 2030 up to the target level of NDC can be achieved by sustaining the existing policies and programmes. However, the BAU scenario has been dynamic over the last decade, and focussed efforts will be required to maintain the momentum, more so with overall budgetary allocations to the forestry sector seeing stagnation over the last few years while pressures on forest land in terms of encroachment and diversion for development projects or under the FRA have continued.

Efforts to strengthen restoration of degraded forest land as well as to promote tree plantations outside forests will require special thrust, which also means that efforts beyond BAU will be required to take care of the additional and focused programmes of forest restoration and tree planting on all available lands, which need to be launched from 2020 onwards. Improving carbon stock within the recorded forest areas will require massive additional effort to reverse the trend of forest degradation. Non-performance on these aspects will increase the risks of falling behind the BAU approach and thus present risks to achieving the NDC target.



Recommendations

Action Points for Forest and Environment Sector

- 1) **Integrated Policy on Land for Addressing Land Degradation:** The issues that impact land degradation and conservation of ecosystems are enshrined in several policies such as the National Forest Policy of 1988, National Agriculture Policy of 2000, National Environment Policy of 2006, National Farmers Policy of 2007, National Water Policy of 2012, National Agroforestry Policy of 2014 and National Mineral Policy of 2019. The need to address land degradation has been mentioned as one of the aims in the passing while the policy remains focused on their core sector agenda. In a combined manner, too, the issue of SLEM does not rise to the level of importance that it ought to. An integrated policy on land degradation is required for the holistic management of issues concerning SLEM.
- 2) **Strengthening Forest Policy:** The National Forest Policy of 1988 has remained a sectoral policy so far, though many aspects of forest conservation depend on sectors outside the forests. The forestry sector has also evolved over the past three decades due deeper understanding of the role of forests in combating climate change, provisioning of ecosystem services and addressing the vulnerability of rural communities. The international understanding on the role of forests has also changed substantially after the 1992 Earth Summit. The role of judiciary has been critical in defining the boundaries and limitations of the legislations related to forests and wildlife in the country. However, these aspects are required to be enshrined in the forest policy in due course. Strengthening of the forest policy is therefore proposed.
- 3) **Increasing Funding for Forest Programmes:** Funding at the Central government level has remained stagnant at about Rs. 8 to 9 billion, whereas that of the states combined is at about Rs. 200 billion. On the other hand, about 30.5 Mha of forest land are categorized as open forest, i.e. having a canopy density between 0.1 to 0.4. Another 4.6 Mha of land falls under the category of scrub, having a canopy density of < 0.1. Degraded forest land constitutes a significant proportion of these forest land categories. Restoration of such land has remained a long-term challenge, both from the perspective of finding resources and the local community's dependency on the resources. As the country's GDP grows, and along with it resources collected in the form of tax and non-tax revenue also grows, the investment by the state in protecting and growing its natural capital should also increase. It is proposed that funding for the sector may be increased to tackle the challenges faced due to environmental degradation and climate change.
- 4) **Focus on Development of "Forest Fringe Villages":** The MoEFCC, in collaboration with the MoAFW, MoRD and Ministry of Skill Development, may consider initiating a special multi-sectoral scheme for the development of forest fringe villages with clear and measurable targets for improvement of various aspects of human development indices. This may be a new scheme or one that is carved out by dovetailing existing rural, agriculture and Tribal Sub Plan schemes.
- 5) **Digitization of Forest Maps:** A scheme on forest land digitization covering all states and UTs for demarcation of forest boundaries and digitization of maps may be initiated. The scheme would also support mapping units/ GIS units in the states which would be helpful for field-level planning and monitoring.



- 6) **Prioritization in Afforestation on Degraded Forest Land:** Mapping of areas within demarcated forests that have lost canopy density in the last 10-15 years would help in identifying areas for reforestation. This programme can be initiated by FSI and subsequently, the state forest departments should be able to develop their capacity to conduct such assessment at their level.
- 7) **Improving the Quality of Planting Material in Afforestation Programmes:** Using quality planting material in afforestation has been emphasized regularly. However, this area of forestry has been challenging. A project on improving the quality of planting material in forestry is proposed. The project would also consolidate the success and research work already done by research institutes such as ICFRE's Institutes in tree improvement and help upscale the same. As part of the project, a National Database of Candidate Plus Trees (CPT) can be created for better record and access of mother trees to all stakeholders. This will also help in institutionalizing the knowledge available with local officials regarding such trees. A mechanism for seed collection from such CPTs and certification needs to be established. The registered suppliers of forest trees can be brought onto one platform to maintain the chain of custody/ certification of seeds collected and sold so that only seeds of known origin can be supplied in the market.
- 8) **Interventions to Reduce Forest Fires, Invasive Species, Pests and Diseases in Forest Areas:** Investments in technological interventions in pilot projects and in scaling up best practices may be considered for addressing problems in these areas. The use of modern predictive tools based on Artificial Intelligence (AI) coupled with RS and GIS can be used for predicting certain incidents and provide valuable lead time to take evasive actions to mitigate the threat. The MoEFCC and State Forest Departments should encourage cross-learning across the states on best practices for reducing forest fires and tackling invasive species and incidences of pests and diseases in forests.
- 9) **Forest Carbon Assessment:** There is a need to establish permanent forest carbon assessment points at the district/ forest division level for periodic measurement of forest carbon to understand changes in the carbon regime in the forests based on the management interventions. This data also will help foresters to keep a record of the changes in soil carbon over time and trend analysis. It is proposed that Forest Survey of India is already equipped with required infrastructure and National Forest Inventory database may be involved in this exercise.
- 10) **Collaboration with Research Institutions:** For improving the effectiveness of the SLEM interventions, a closer liaison with the Indian Council of Agricultural Research (ICAR) and ICFRE institutions is proposed with ongoing programmes and schemes so that research outputs related to SLEM can be mainstreamed. This will allow the implementing agencies to promote action research on SLEM and help adopt relevant technologies by including them in the plans under the existing schemes.
- 11) **Focus on Wildlife Corridor Development:** Nationwide mapping and development of wildlife corridors and establishment of Protected Area (PA) network by connecting wildlife landscapes, securing the protection of corridors in existing laws, i.e. Indian Forest Act, Wildlife Protection Act, Eco-sensitive Zone notifications and Coastal regulation zone notifications are being proposed. This initiative may be taken up by studying present and historical land use of the area and the trends in change of land use, modelling optimal land use in such corridors to serve the needs of wildlife as well as the livelihoods of people, devising schemes to incentivize landowners in the corridor areas to maintain conducive land use, putting in place unobtrusive systems to monitor



- wildlife use of the corridor as well trends over longer timeframe for taking ameliorative action well in time, allowing CSR contributions for activities such as compensation for wildlife depredation and developing SOPs such as the do's and don'ts to avoid encounters with wildlife.
- 12) **Strengthening State Biodiversity Boards:** The institutional arrangement within the State Biodiversity Boards (SBBs) need to be reviewed to make them stronger and effective. Intermediate level institutions and quality technical support agencies are required for SBBs to coordinate with and handhold the Biodiversity Management Committees at the Panchayat level. The State Biodiversity Boards also need to be transformed into pro-active rather than reactive agencies.
- 13) **Mapping and Protection of Wetlands:** Mapping of wetlands along with their zone of influence and drainage may be done in a time bound manner. Mapping smaller wetlands, which are not on the list of major wetlands under any existing conservation programmes is critical. Clear responsibility may be given to concerned landowners to conserve the wetlands and ensure that they are in good health. A mechanism for periodic water quality monitoring may be set up. The demarcated wetlands may be tagged with revenue survey numbers and diversion should not be allowed. Panchayats may be entrusted with the powers under the Panchayati Raj Act to protect the wetlands and waterbodies so identified during the mapping exercise.
- 14) **Enabling Ecosystem for Growing Trees:** Policy and institutional support is needed to make tree growing more attractive to farmers and other individuals. Simplification of harvesting and transit requirements are needed. A system for tree certification may be developed that allows voluntary registration of trees by landowners and tracking the same over its lifetime. Developing a mechanism for the certification of planting material, especially for the key species used in agroforestry, i.e. *Eucalyptus* spp., *Melia dubia*, poplar, *Casuarina*, bamboo species is required. Policy and guidelines may be framed for bringing vacant land under private or institutional ownership under green cover with a provision that such green cover may be allowed to be removed whenever required by the owner/user of the land to incentivize the landowner and users to for bringing such an area under green cover.
- 15) **Diversion of Forest Land – Improving Monitoring and Assessing Impact Post Land Diversion:** The conditions under which individual cases of forest land diversion have been permitted need to be properly monitored. An appropriate monitoring system may be established at the central level to enable the same. Since good quality data regarding forest land diversion is available (for land diverted since 1980), the impact of diversion on and beyond the land diverted may be studied and learnings arising out of the study should be used in defining the compensation structure for land diversion in future as many of these unintended consequences, which may be difficult to avoid, are currently not priced in the compensatory value of forest land diverted.
- 16) **Arriving at a Consensus Definition of Wasteland/ Degraded Land:** A common understanding and agreement on standard definition and methodology for identifying degraded land and its sub-classifications are required. At the same time, dedicated institutions at the Centre and state level should be recognized that can follow the methodology and identify such land and prioritize them for restoration over the next 10 years. Agencies such as the National Bureau of Soil Survey and Land Use Planning having long experience in this area may be involved in the exercise.



- 17) **Target Setting for LDN:** It is important to consolidate the coverage of area under LDN taken up under various schemes, remove duplication and subsequently use the information for planning future interventions. The consolidated information should also be compared with the land degradation status map of the country. It will also be important to divide the target under identified key monitoring areas related to SLEM with clear responsibilities to various stakeholders and cascade them to subordinate implementation units for improved outcomes and transparency. Closer coordination at the centre and state level among three key departments - Forest, Agriculture and Rural Development - responsible for achieving most of the LDN targets will be a key enabler. Detailed land planning for restoration will be important to optimize funding requirements by removing duplications, increasing collaboration, fostering convergence and enhancing efficiency.
- 18) **Framework to Monitor LDN:** Primary stakeholders from various ministries and departments in the Government of India, namely MoEFCC, MoRD, MoJS, MoAFW and their subordinate organizations, may be identified for reporting under the UNCCD monitoring framework. Their orientation should be conducted on the reporting parameters. The definition of hotspots and brightspots across various dimensions related to land management, i.e. land cover area, land productivity dynamics, soil organic carbon and both above ground and below ground, have to be finalized by the nodal reporting authority, i.e. MoEFCC in consultation with other stakeholders for maintaining uniformity in understanding and reporting.
- 19) **Develop a Centre of Excellence on Sustainable Land Management:** A Centre of Excellence (CoE) on Sustainable Land Management at ICFRE can be an apt institution to facilitate and host such a forum. The proposed CoE can provide support at the national level for handholding implementing agencies and coordinating nationwide efforts on SLEM. The CoE will work towards harnessing knowledge, creating a knowledge repository on SLEM and widely disseminating the same for the benefit of practitioners. Besides creating a database on land degradation, training and capacity building, national-level reporting on LDN, coordinating research on SLEM with international agencies for sharing knowledge and best practices on sustainable land management are also being proposed.
- 20) **Develop Specific Project on SLEM at the National Level:** A special project may be initiated that can become a model for the future to demonstrate a multidisciplinary, multi-sector and people-centric approach in implementing LDN. Funding for such a legacy project can be arranged from international agencies committed to financing mitigation and adaptation programmes under UNFCCC and LDN under UNCCD.
- 21) **Road Sector's Contribution of LDN and NDC:** The National Highways Authority of India (NHAI) may consider a partnership with the State Forest Departments to implement "Green Highways" for improving the outcomes and quality of plantations along new and old National Highways.
- 22) **Focussed Attention on Rehabilitation of Mined-Out Areas and Abandoned Mines:** A special programme should be taken up to rehabilitate abandoned mines and other mined-out areas, which are not covered under active Environment Management Plans (EMPs). The programmes would entail interventions on forestry, reclaiming land for wildlife habitat, conservation of water, and addressing livelihoods of the local communities. Funds from the District Mineral Funds can be exploited for this purpose. The Sustainable Development Framework for the mining sector needs to be properly implemented. The quality of monitoring of the EMPs may be enhanced through respective ministries and third-party audits to achieve better outcomes.



- 23) **National Carbon Market:** Launching a national level carbon market for allowing carbon emissions trading within India will encourage flow of funds from private entities. Such funds could be made available to finance climate change mitigation and adaptation projects including LDN projects in the country.
- 24) **Enforcement of Sand Mining Guidelines, 2020:** States should adopt stricter rules in the light of Sand Mining Management Guidelines, 2020 issued by the MoEFCC. In addition to the national guidelines, all states should formulate State-level Sand Mining Regulations with strict compliance procedures and plans.
- 25) **Encouraging the Involvement of Students in Fighting Land Degradation:** A Graduation Legacy Policy is proposed to cover students appearing in the senior secondary board examinations or who are in the final year of graduation under any stream. Under the policy, such students in India will need to plant at least 5 trees for getting their high school leaving certificate or their graduation diploma or degree certificate. The present Van Mahotsav program implemented throughout the country can co-opt this initiative.
- 26) **Establishing a Mechanism for Measuring SDG Indicators Related to SLEM:** The introduction of a separate mechanism for measuring SDG indicators related to SLEM may be considered. An SDG dashboard may be developed at the MoEFCC for tracking the progress. District-wise allocation of targets may be undertaken, and relevant systems may be put in place to map and measure progress in the national level indicator with respect to land degradation, sustainable wetland management and wildlife crime.

Action Points for Agriculture Sector

- 27) **Policy on Development of Grassland and Grazing Lands:** A grassland policy is proposed as a strategy to arrest land degradation and to promote ecological and fodder security, better management of livestock and fodder availability, and create an enabling environment for recognizing grazing as tenurial rights under the state tenancy acts. There is a need for authentic database of grassland based on mapping as current revenue records across states have recorded grasslands under various categories of common lands. There is also a need for a ground-level assessment and corrective action by the authorities as grasslands continue to be under illegal occupation, encroachments and subjected to other pressures. National Grasslands Authority may be a solution to comprehensively address the conservation, development and sustainable use of grasslands.
- 28) **Special Scheme for Development of Grasslands and Grazing Lands:** A special scheme on the development of grazing and grassland may also be taken up which would focus not only on ecological rehabilitation of grasslands but also on livestock improvement, extension of the dairy value chain, diversified livelihood options and behaviour change.
- 29) **Disincentivizing Overuse of Water for Agriculture:** The national and state-level water policies need to identify measures that would optimize the existing irrigation facilities, including building small reservoirs locally and reducing water transportation and distribution losses through long-distance canals and distribution networks. The groundwater-energy nexus has also created perverse incentives, which have been the major driver of ground water depletion and agricultural land degradation. Policy measures for disincentivizing the overuse of water in



agriculture is a need of the hour, keeping future sustainability in perspective.

- 30) **National Portal for Agroforestry:** A National Portal for Agroforestry may be developed as a user-friendly one-stop portal for authentic information on various agroforestry and tree species and methods of growing and maintaining plantations. The portal, in due course, will provide a large users database that can be used in agroforestry extension as well.
- 31) **Incentives for Investments in Land Protection:** Policy measures to incentivize investment in land protection measures on private land may be considered. This would be similar to the incentives provided for micro irrigation, horticulture development etc.

- 32) **Subsidy Specific Study on Agriculture:** Input and output subsidies affect the entire agriculture value chain as they are connected in a complex web with production, farmers' income, businesses of related industries, and price to consumers. Most of these subsidies are well ingrained in the agricultural economy and changing any one of them has a cascading effect on the entire value chain and evokes drastic responses from the socio-political ecosystem. There have been various studies on the economics of subsidies in general. However, study of incentives and modelling them for impacts on land degradation which have not been taken up so far is recommended.

Action Points for Water Sector

- 33) **Linking National Water Policy to Land and Forests:** The National Water Policy (NWP) 2012 treats water as a hydro-geological and techno-economic entity for managing the demand and supply balance, whereas the supply side management of water is not covered with the same intensity. The quality and quantum of both surface and groundwater largely depend on land and forests, but the role of land and forest in creating water availability, an important provisioning ecosystem service, is not adequately emphasized. Thus, the linking of water with land and forests is required in the NWP which will strengthen the management of land and forests for water security.
- 34) **Legislation on Ecological Flows in Rivers:** A scientific assessment of ecological flows may be carried out across all major river basins in the country. Based on the assessment, an appropriate notification may be issued wherein maintaining specific basin-wide ecological flows is made mandatory. This could be made justiciable by a supporting legislation.
- 35) **Participatory and Decentralized Groundwater Management:** It is necessary to separate water rights from land rights to regulate the overuse of groundwater. However, the major impediment to delinking land and water rights are the Transfer of Property Act and the Indian Easement Act. A program to encourage states to discontinue perverse subsidies that exploit groundwater, accelerate soil erosion, and reduce soil health may be initiated. Electricity Regulatory Agencies need to regulate or discontinue electricity subsidies for groundwater pumps taking a cue from innovative practices in some states. The State Electricity Regulatory Commissions and the state governments need to provide adequate emphasis on strategic shift that would reduce groundwater exploitation. To aid transparency and data sharing, an integrated water balance system that indicates how water is being utilized at the local, sub-basin and basin levels may be established.



Institutional Mechanisms and Decentralized Governance to Support SLEM

- 36) **Common Planning Tool for MGNREGS and Watershed Projects:** A common planning tool for MGNREGS and Watershed projects at the Gram Panchayat (GP) and micro-watershed level may be developed. The effectiveness of MGNREGS can be improved by blending the net planning process. Areas in villages can be identified and prioritized for treatments, and a list of possible works can be prepared at least one season in advance. The same can be widely shared with the beneficiaries to enable better labour deployment. The GP can undertake implementation following "a ridge to valley" approach based on the labour demand. The technical team under the watershed programmes can provide the technical support for preparing the NRM plan under MGNREGA. Working Plans under forest departments may be aligned with the watershed plans and vice versa for better coordination and convergence.
- 37) **Special Provisions under MGNREGS for Tribal and Forest Fringe Villages:** For improving employment in tribal areas flexibility in MGNREGS rates and increasing the limit for maximum per household employment in forest fringe villages to up to 200 days may be considered. This intervention would be in addition to the targeted programs for livelihood development being undertaken in such areas. Increased livelihood opportunities for tribal population will reduce the dependence on forests for subsistence, provide other benefits such as addressing distress migration and improving nutrition standards.
- 38) **Revival of Land Use Boards:** While considerable attention has been given to land reforms throughout formal planning processes in India, institutional response to sustainable land use, management, and governance has been absent. State Land Use Boards were set up by 1974 in most of the states and UTs and restructured in 1985 as the apex body on land use at the state level under a Centrally-sponsored Program. It had the mandate to provide policy direction for sustainable development of land resources, ensure inter-departmental coordination and initiate integrated planning. However, the State Land Use Boards have remained largely defunct. The boards are required to be revived to act as a unified body at the state level to mainstream sustainable land management and address the issue of land degradation.
- 39) **Integrating SLEM with Panchayat Development Plans:** SLEM may be integrated into the Gram Panchayat Development Plan, Block Development Plan and District Panchayat Development Plan. Secondary data from the line departments, especially MGNREGS, Forest, Agriculture, Watersheds, others like Bhumi Sudhar, can be fed into planning through coordination with line departments prior to the preparation of such plans. At the preparation stage of the Development Status Report, prioritization of activities and convergence strategy in the context of SLEM can be finalized for each Gram Panchayat.
- 40) **Standing Committees in Panchayat on Land Management:** State governments may be advised to incorporate the provision of constituting a Standing Committee on land and water resources in the GPs with clearly demarcated responsibilities for land conservation, addressing soil erosion, desertification, soil and moisture conservation and other problem related to lands, protection and checking encroachment in common land, forest land and village water bodies. These committees can also function as touchpoints for JFMCs, Ecodevelopment Committees (EDCs) and Watershed Management Committees at the village level.



Addressing Social Aspects for SLEM

41) Strengthening Community Participation in SLEM

Programmes: Community participation in the SLEM programs may be strengthened through facilitation by NGOs and voluntary organisations. Imparting training to the project staff, particularly those at block and panchayat level in participatory planning, implementation and monitoring is recommended. Training programs for project beneficiaries, GP and Gram Sabha, to build their understanding of SLEM and their role in sustainable management of natural resources is also recommended.

42) Gender Mainstreaming in SLEM Policies and

Programmes: Although individual policies and programmes include women as stakeholders, an overarching framework of gender inclusiveness and mainstreaming gender across policies is missing. Mapping the needs of most vulnerable sections, promoting women's participation in the decision-making process at the micro-level, reporting, monitoring and reviewing to include gender-related indicators is required. Besides, gender audit may be institutionalized as part of social audit across programmes.

43) Addressing the Need of Women Farmers in the Implementation of SLEM:

An overall strategy to address the needs of women farmers belonging to diverse groups, such as legal owner-cultivator, cultivators of family farms without legal ownership, tenants and sharecroppers, small and marginal farmers, and agricultural wage workers, need to be considered. Implementation of legal ownership of

agricultural land, particularly of women farmers who belong to women-headed households and farmers who are now widows, single, or physically challenged, also needs attention, if SLEM to be achieved from all social dimensions.

44) Management of Village Common Property

Resources: For the management of village commons, assessment of the status of Common Property Resources (CPR) and planning by synergizing programmatic interventions across various schemes such as MGNREGS, IWMP/ WDC-PMKSY, CAMPA and GIM is recommended. Further, development of a strategy for alternative fuel or fodder resources in the areas where CPRs are scarce and cannot meet the demands of rural communities is also proposed. Engagement of rural communities in the management of grazing land may also be institutionalized.

45) Implementation of PESA:

Compliance of the State Panchayati Raj Act and relevant subject laws with the Provisions of the Panchayats (Extension to Scheduled Areas) Act (PESA) needs to be completed where it is pending so that the Gram Sabha/ Gram Panchayat can establish ownership and control over the community resources of land, water and forest and take decisions for their management and conservation. Rectifying ambiguities in PESA in the areas that have led to divesting/ diluting the power of Gram Sabha/ Gram Panchayat is also necessary.



Focusing attention on the following prioritized list of recommendations could be a good initiation to institutionalize SLEM

Actions with a shorter roadmap	Actions needing sustained support
<ul style="list-style-type: none"> • Arriving at a consensus definition of wasteland/ degraded land • Target setting for LDN • Framework to monitor LDN • Digitization of forest maps • Mapping and protection of wetlands • Prioritization in afforestation on degraded forest land • National Portal for Agroforestry • Enabling ecosystem for growing trees • Standing Committee on Land Management in Panchayats • Develop a Center of Excellence on Sustainable Land Management • Common planning tool for MGNREGA and watershed projects • Contributing to LDN and NDC through greening of highways 	<ul style="list-style-type: none"> • Develop a specific project of SLEM at the national level • Focus on development of "Forest Fringe Villages" • Increasing funding for forestry programmes • Policy on development of grasslands and grazing lands • Special scheme for development of grasslands and grazing lands • Revival of Land Use Boards • Improving quality of planting material in afforestation programmes • Special provision for MGNREGA in Tribal and Forest Fringe Village areas • Subsidy specific study on agriculture • Management of village common property resources • Interventions to reduce forest fires, invasive species, pest and diseases in forests area • Enforcement of Sand Mining Guidelines, 2020

Capacity Development

Gaps in the current capacities regarding SLEM can be broadly classified as thematic or subject-specific and institutional gaps. The conceptual understanding of treating land and ecosystems differently has oriented policy-making, institutional structures and implementation architecture till date and has been a significant barrier for taking SLEM forward. SLEM is still a relatively new approach and lacks standardization of definitions, approaches and frameworks. SLEM is also not part of the training curriculum of the training institutions of either the Centre or the state government.

There is also little research being conducted on SLEM in the context of cross-cutting and the complex interplay of systems. There is a need to build SLEM conceptually and thematically through action, policy and academic research. This can be addressed by the training institutes

for higher and provincial civil services, professional colleges and institutions such as ICAR and ICFRE. It is imperative that the current understanding, lessons and impacts of SLEM approaches are shared with practitioners and policy makers to build their perspectives on SLEM.

SLEM adopts a multi-stakeholder approach requiring various departments to work together at multiple levels to make it happen, which given the current system of departments working independently focussing on their core mandate, will entail learning new ways of working. Capacity building for mainstreaming SLEM needs to be addressed strategically. Mapping capacity gaps and interventions in key institutions backed with necessary financial resources need to be undertaken.

Orientation programs on SLEM for law and policymakers, state and district level officers, implementation level staff, support units and research organizations are



proposed. While the CoE on Sustainable Land Management can coordinate the capacity building at the national level, a dedicated unit at the state level is required to take care of capacity building needs at the state, district and local levels. The involvement of training resource organizations to support in reaching out and delivering quality training of a uniform standard is also proposed.

Financing SLEM in India

The recommendations for operationalizing SLEM are of three types – policy development and harmonization, institutional strengthening, and programme-related.

Each recommendation will have a different impact on the financial requirements. Ordinarily, policy recommendations may not require much upfront investment in financial terms except for the efforts for new research or data collection. However, the overall financial impact of how the goods and services would flow post the policy implementation may change substantial, which can only be gauged at a higher level.

Institutional strengthening can also be viewed from two perspectives – one, where new institutions are to be

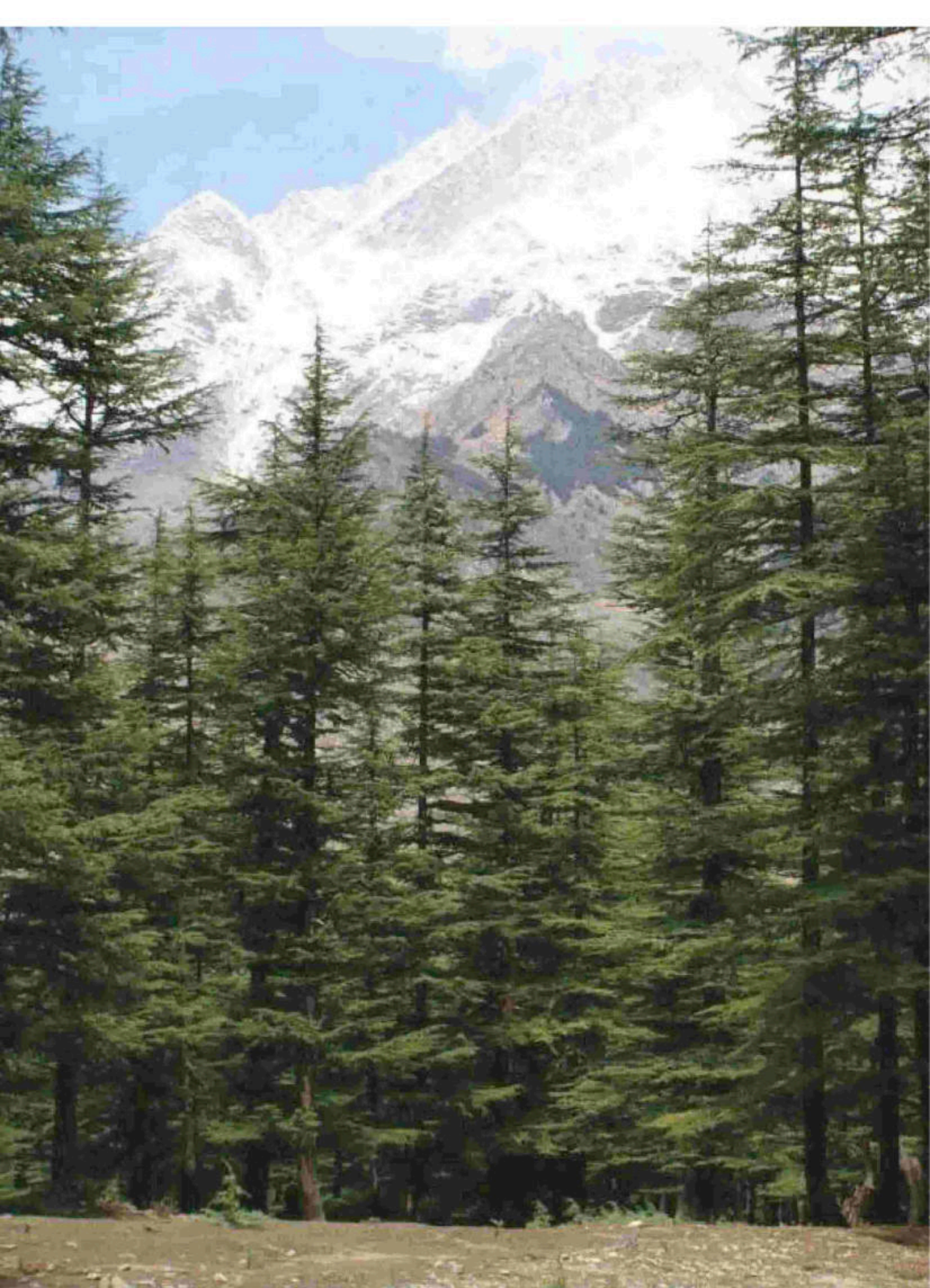
created and second, where changes are to be made in the current arrangements of coordination and reporting.

However, existing institutions which have a critical role in operationalizing SLEM and are working under sub-optimal resource conditions, will require additional support if the institutional capacity gaps are to be bridged. Given the lack of detailed visibility on how the institutional landscape will emerge, estimating the financial investment for such a scenario may not be practical at this stage.

However, estimation of programmatic interventions can be done based on the cost norms at present and has been covered in the report. The overall funding requirement for ten years to implement the programmatic recommendation for SLEM is estimated to be Rs. 2,605 billion.

Given the criticality of actions required to tackle land degradation and also that the target period for achieving restoration of 26 Mha degraded land is 2030, most of the activities would have to be taken up in the short to medium term. Achieving the milestones in three to five years will give adequate time for the interventions to be grounded and produce measurable results by 2030.





CHAPTER

1



Introduction



(vegetation degradation) would increase if measures to reduce degradation, restore degraded land and achieve LDN are not undertaken.

India, a signatory of the UNCCD, has declared to restore 26 Mha of degraded land by 2030 as a target under the global effort to achieve LDN. Addressing land degradation is one of the immediate priorities as land degradation affects all ecosystems and land uses, such as grasslands, forests,

croplands, and wetlands and requires effective and integrated policy approaches to arrest the change on the ground. However, the implementation of the international instruments and the role of national institutions needs a revisiting in the context of new challenges of climate changes and economic development to support a large human and animal population.

1.2 Sustainable Land and Ecosystem Management in India

Sustainable Land and Ecosystem Management (SLEM) flows from Sustainable Land Management (SLM) which was defined at the Rio Earth Summit in 1992 as *“the use of land resources, including soils, water, animals and plants, for the production of goods to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions”*⁴.

The productivity and sustainability of any given land-use system depends on the interactions between land resources, climate, and human activities. Adopting suitable land uses for biophysical and socio-economic conditions is essential for minimizing land degradation, rehabilitating degraded land, and ensuring sustainable use of land resources (i.e. soils, water, and biodiversity).

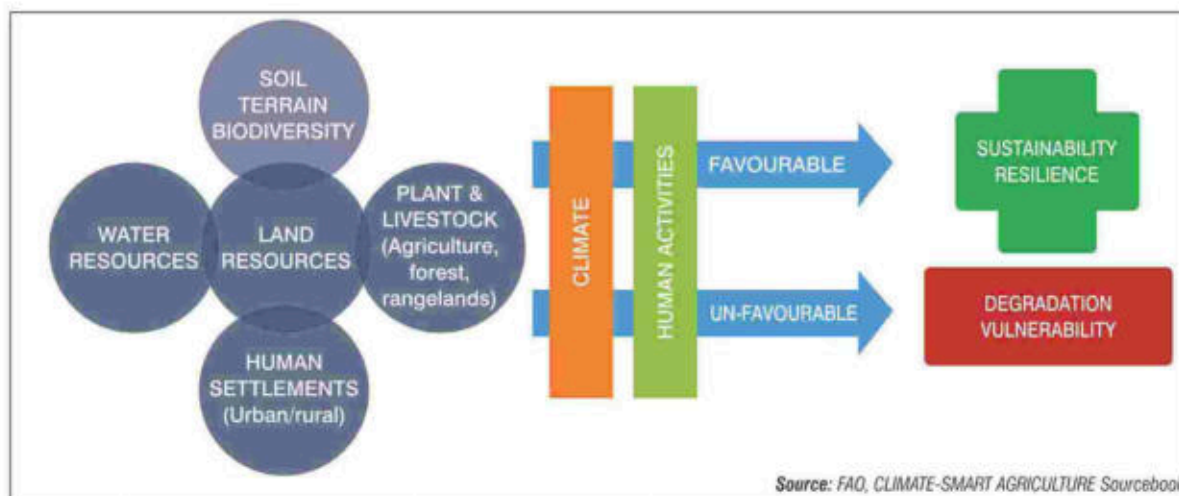


Figure 1. Factors contributing to Sustainable Land Management

Four principles of SLM⁵:

- Targeted policy and institutional support, including the development of incentive mechanisms, for SLM adoption and income generation at the local level
- Land-user-driven and participatory approaches
- Integrated use of natural resources on farms and at the ecosystem scale

- Multilevel, multi-stakeholder involvement and partnerships at all levels – land users, technical experts and policy-makers

As land is an economic, ecological, and social resource, SLEM harmonizes human and environmental needs. An integrated and holistic approach is required when studying various aspects of land use and land management.

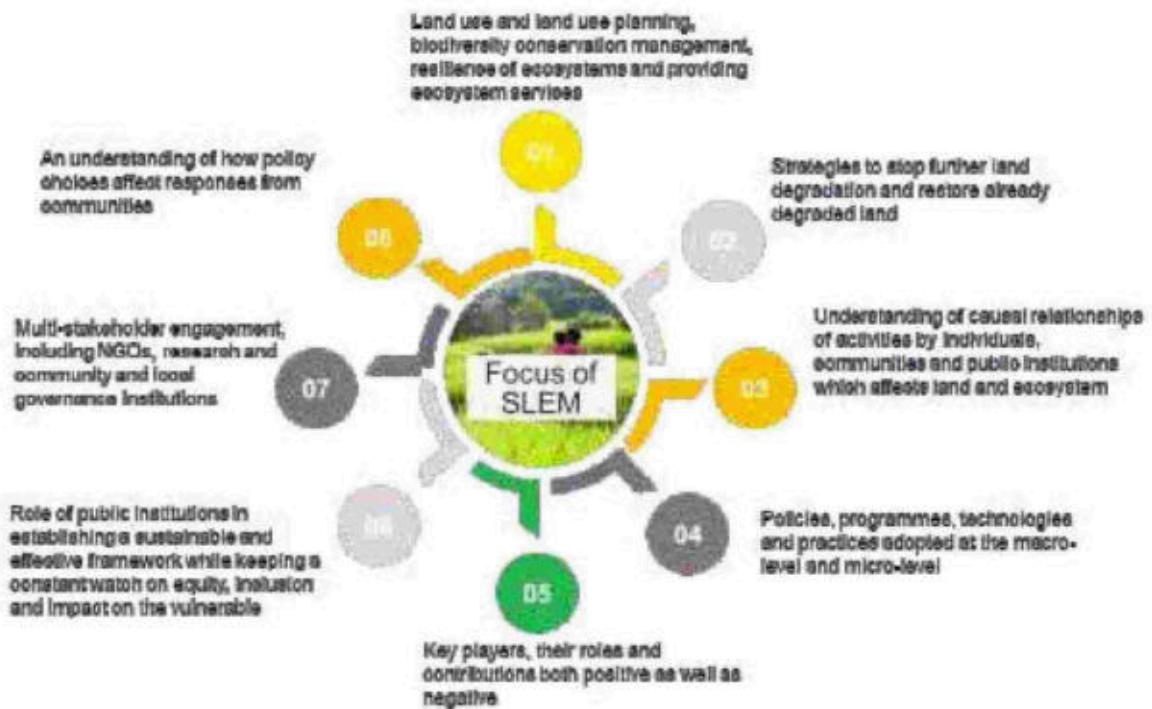
⁴ <https://knowledge.unccd.int/knowledge-products-and-pillars/best-practices-sustainable-land-management>

⁵ <http://www.fao.org/land-water/land/sustainable-land-management/en/>



One of the key ingredients of SLEM is achieving optimality by using land as per the land productivity class. However, such a paradigm has not been possible in practice due to many reasons, including geography, location, economic and social imperatives.

Understanding of SLEM sets the foundation of the assignment. The critical elements of SLEM are listed below:



Economic choices drive most of the land-based human activities. Such decisions are distorted to a large extent by the inability of the policy and institutional regime to price the actual cost of land, including its ecological cost. It exacerbates the cost of land degradation or restoring degraded land to recoup its ecological function and is often neither clearly understood nor adequately priced.

SLEM started in India as a joint initiative of the Government of India and the Global Environment Facility (GEF) under the GEF Country Partnership Programme (CPP). The programme's objective was to promote sustainable land management and use of biodiversity and maintain the capacities of ecosystem services while considering climate change. The Desertification Cell under MoEFCC was the National Nodal Point for SLEM programmatic approach, while the Indian Council of Forestry Research and Education (ICFRE) was the Technical Facilitation Organization for the SLEM programme.

SLEM provides an opportunity for a diverse group of stakeholders to share their skills and experiences for achieving land and ecosystem management objectives. It is in line with both their economic interests and the agreed principles of sustainability, reflected through integrating biodiversity conservation in agriculture, other natural resource-based production systems and adaptation-based farming systems to the consequences of climate change.

Many national strategies, objectives, and approaches on SLEM have also been influenced and shaped by the international conventions in which India has played an important role. Some major multilateral conventions/ agreements related to environment are listed in Annexure-1.



1.3 Definition of Land Degradation

There are subtle differences in how various organizations have defined land degradation. While those definitions primarily convey the same meaning, the technical level nuances cause differences in common understanding, activities excluded, and how to measure land degradation.

Some of the crucial definitions of land degradation used by international organizations are as follows:

- United Nations Development Programme (UNDP) has defined Land degradation as *"the reduction or loss in the capacity of soil and land resources to produce food, fodder and other ecosystem services"* (Kgomotso, 2017).
- International Fund for Agricultural Development (IFAD) defines land degradation as the *"land which due to natural processes or human activity is no longer able to sustain an economic function properly and/or the original natural ecological function; or, the loss of the productive capacity of the land to sustain life"*.⁶
- The Food and Agricultural Organisation (FAO) defines land degradation as a *"temporary or permanent decline in the productive capacity of the land"*.⁷
- The United Nations Convention to Combat Desertification (UNCCD) defines land degradation as *"the reduction or loss of the biological or economic productivity and complexity of rain-fed cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from a combination of pressures, including land use and management practices."*⁸

- The IPCC defines Land degradation as a *"negative trend in land condition, caused by direct or indirect human-induced processes including anthropogenic climate change, expressed as long-term reduction or loss of at least one of the following: biological productivity, ecological integrity, or value to humans"* (IPCC, 2018).

The definition of land degradation in the Indian context is not different to those used internationally. However, the erstwhile Wasteland Development Board defined wastelands as 'degraded land that can be brought under vegetative cover with reasonable effort and is currently underutilized and land deteriorating for lack of appropriate water and soil management or on account of natural causes.' In several discourses, wastelands have been used synonymously with degraded land, which is scientifically not correct.

The Wasteland Atlas of India, 2019 (DoLR and NRSC, 2019), does not define wasteland but details the different wasteland categories in the country. There is no specific definition of wasteland in the ICAR document available in the public domain (NAAS, 2010).

A range of definitions of wasteland makes it hard for managers to identify, prioritize and focus attention on specific land parcels or landscapes for addressing land degradation. It is one of the problems which needs to be addressed in the sector in the country.

1.4 Mapping Land Degradation

National-level initiatives for mapping land degradation in India are being carried out since 1986 when the National Remote Sensing Centre (NRSC), at the instance of the National Wasteland Development Board (NWDB), initiated

mapping of wastelands at 1:50000 scale and completed the mapping task for the entire country in the next 14 years in a phased manner using satellite data. Later, NRSC executed two more mapping cycles in 2003 and 2006 to

⁶ <https://www.environmentalpollution.in/essay/land-degradation-essay/essay-on-land-degradation-india-environment/4660>

⁷ [https://archive.unu.edu/env/plec/l-degrade/D-Ch_2.pdf#:~:text=Land degradation generally signifies the temporary or permanent, the productive capacity of the land \(UN/FAO definition\).](https://archive.unu.edu/env/plec/l-degrade/D-Ch_2.pdf#:~:text=Land%20degradation%20generally%20signifies%20the%20temporary%20or%20permanent%20the%20productive%20capacity%20of%20the%20land%20%28UN/FAO%20definition%29.)

⁸ [https://knowledge.unccd.int/knowledge-products-and-pillars/ldn-monitoring/sdg-indicator-1531#:~:text=The UNCCD defines land degradation as "the use and management practices" \(UNCCD 1994, Article 1\).](https://knowledge.unccd.int/knowledge-products-and-pillars/ldn-monitoring/sdg-indicator-1531#:~:text=The%20UNCCD%20defines%20land%20degradation%20as%20%22the%20use%20and%20management%20practices%22%20%28UNCCD%201994%2C%20Article%201%29.)



update and monitor the status of wastelands, using satellite data of different periods. Apart from NRSC, Space Applications Centre (SAC), National Academy of Agricultural Sciences (NAAS), National Bureau of Soil Survey and Land Use Planning (NBSSLUP), Soil and Land Use Survey of India (SLUSI), and Forest Survey of India (FSI) have contributed to the mapping of wasteland and land degradation.

Multiple agencies have done assessment and tracking of land degradation by applying different methods with varying outcomes that do not converge. It has also contributed to problems in prioritization. Nevertheless, these institutions play an essential role in implementing SLEM in the country (Table 1).

Table 1. Role of institutions in implementing SLEM

S. No.	Institution/Agencies	Role and Methodology	Current/ Future Role in SLEM
1	Forest Survey of India, Dehradun	Mapping of forest cover in India and producing bi-annual India State of Forest Report	Mapping of forest cover, techniques, forest and Tree Outside Forest (TOF) stock estimation, forest carbon estimation
2	National Remote Sensing Centre, Hyderabad	Satellite data products, BHUVAN services, wasteland, and wetland mapping	Satellite data products, mapping, technology, disaster management
3	Space Applications Centre, Ahmedabad	Design of space-borne instruments for ISRO missions and development and operationalization of applications of space technology for societal benefits. The applications cover communication, broadcasting, navigation, disaster monitoring, meteorology, oceanography, environment monitoring and natural resources survey.	Sensor design for SLM related parameters
4	Survey of India	Survey Maps, Digitalmap	Digital base maps and toposheets
5	Geological Survey of India	Creating and updating National geo-scientific information and mineral resource assessment	Survey and mapping of specific areas and regions, vulnerability mapping
6	National Bureau of Soil Survey and Land Use Planning	Soil Maps, Research bulletins on Remote Sensing applications, Land Quality Assessment and satellite technology, related research papers	Soil mapping, DSS, land degradation mapping techniques
7	Soil and Land Use Survey of India	Conducting soil survey of different intensities to provide a scientific database for developmental programmes encompassing soil and water conservation planning, watershed development and scientific land use planning	Survey and mapping in collaboration with other agencies, degraded land in the country, ground-truthing
8	Settlement Survey and Land Records wings in States	Conducting land surveys, updating of revenue maps, record keeping	Maintain updated status of the land, including wasteland and common land in the states.

The key statistics related to the extent of degraded land is summarized in the Table 2.



Table 2. Estimation of degraded land / wastelands in India

Report	Published Year	Estimated Area Mha	Data used	Other details
Space Applications Centre				
Desertification and Land Degradation Atlas of India	2021	<p>The area undergoing land degradation was estimated to be 97.85 Mha in 2018-19 (29.77% of TGA of the country).</p> <p>Area undergoing Desertification and Land Degradation during 2011-13 and 2003-05 was 96.40 Mha (29.32% of the TGA) and 94.53 Mha (28.76% of the TGA) respectively.</p> <p>The most significant process of desertification/ land degradation in the country is Water Erosion (11.01% in 2018-19, 10.98% in 2011-13 and 10.83% in 2003-05), followed by Vegetation Degradation (9.15% in 2018-19, 8.91% in 2011-13 and 8.60% in 2003-05) and Wind Erosion (5.46% in 2018-19, 5.55 % in 2011-13 and 5.58 % in 2003-05).</p>	<p>On-screen visual interpretation of IRS, Advanced Wide Field Sensor (AWiFS) data with 56 meters spatial resolution of 2018-19.</p> <p>Ancillary data used Desertification status maps of 2011-13 and 2003-05</p>	<p>The current atlas "Desertification and Land Degradation Atlas of India (Assessment and analysis of changes over 15 years based on remote sensing)" provides Desertification/ Land Degradation status of the country for 2018-19 timeframe. In addition to this, the atlas also provides change analysis over 15 years, from 2003-05 to 2018-19.</p>
Desertification and Land Degradation Atlas of selected districts of India	2018	<p>Mapping was carried out for 49.66 million ha, which is ~ 15.10 % of the country's total geographical area. Out of which 22.80 Mha area found to be undergoing land degradation in the assessment period of 2011-13. It compares with 22.94 million ha of the area under degradation during the time frame 2003-05. A cumulative decrease of 0.14 million ha (i.e. 0.28% of the total area mapped) occurred in the area undergoing land degradation.</p>	<p>(Based on IRS LISS III data of 2011-13 and 2003-05), 23 m spatial resolution</p>	<p>1:50,000 scale maps of desertification/ land degradation for 76 districts and two sub-basins in Leh district of Jammu & Kashmir used. Types of processes of degradation considered are - vegetation degradation, water erosion, wind erosion, salinity/ alkalinity, water-logging, mass movement, frost heaving, frost shattering and artificial reasons.</p>
Desertification and Land Degradation Atlas of India	2016	<p>The area undergoing land degradation was estimated to be 96.4 Mha in 2011-13 (29.32% of TGA of the country) against 94.53 Mha in 2003-05.</p> <p>The area under desertification</p>	<p>Based on IRS AWiFS data of 2011-13 and 2003-05 56 m spatial resolution on 1:500,000</p>	<p>This Atlas presents Desertification /Land Degradation Status Maps depicting Land Use, Process of Degradation and Severity Level, and area statistics consolidated for the entire country and state-wise for 2011-13 and 2003-05 time frame reports the changes.</p> <p>There is a cumulative increase of 1.87 Mha</p>



		(arid, semi-arid and dry sub-humid regions of the country) was estimated during 2011-13 as 82.64 Mha; whereas, during 2003-05 as 81.48 Mha. Rajasthan, Maharashtra, Gujarat, Jammu & Kashmir, Karnataka, Jharkhand, Odisha, Madhya Pradesh, and Telangana contributed around 23.96% (2011-13) of desertification/ land degradation concerning TGA		area undergoing desertification/land degradation in the country (constituting 0.57% of the TGA of the country) during the time frame 2003-05 and 2011-13. The change analysis carried out for 2011-13 and 2003-05 time frames indicates that around 1.95 Mha land has been reclaimed and 0.44 Mha land has been converted from high severity to low severity degradation class, showing improvement. On the other hand, around 3.63 Mha productive land has degraded, and 0.74 Mha land has converted from low severity to high severity degradation. Further, high desertification/land degradation changes are observed during this time frame in Delhi, Tripura, Nagaland, Himachal Pradesh, and Mizoram (11.03 to 4.34 %), whereas Odisha, Rajasthan, Telangana, and Uttar Pradesh have shown improvement (-0.11 to -1.27 %).
National Remote Sensing Centre				
Wastelands Atlas of India	2019	The total wasteland area in the country was estimated at 55.76 Mha (16.96% of TGA). During the period, 14,536 sq. km of land was converted to the non-wasteland category	2008-09 and 2015-16	23 m resolution satellite data used, mapping at 1:50,000 scale, 23 categories of wasteland identified and mapped. The previous report was Wasteland Atlas 2011, based on 2008-09 data
National Academy of Agricultural Sciences				
Degraded and Wastelands of India Status and Spatial Distribution	2010	The harmonized area statistics of degraded and wastelands of India stand at 120.72 Mha (104.19 Mha of arable land and 16.53 Mha of forest area). The data was harmonized with NBSSLUP, CSWRTI, CAZRI, CSSRI Karnal, FSI and NRSA.	Water erosion 2007, wind erosion 2007, acid soils 2005, salt-affected soils 2004, Forest cover 1999, wasteland data 2003	Some degradation classes (not responsive to amendments or management) were excluded. For example, theoretically, any soil with a pH of less than 7 is acidic, but responses to amendments and reclamation were not observed in the soil having a pH less than 5.5. Similarly, snow-covered land or glaciers were excluded. Forest land with more than 40% canopy was not considered degraded during the harmonization process. Soil erosion below 10 tonnes per hectare generally does not significantly affect productivity and has not been counted as degraded wastelands. Therefore, the harmonized estimates have been derived from the practicalities of the reclamation, amelioration, and management for agricultural planning rather than purely academic interest.
ICAR- Central Soil Salinity Research Institute				
Mapping of salinity affected soils	1996	6.74 Mha across 17 states		Gujarat, Uttar Pradesh, Maharashtra, Rajasthan, and West Bengal have 75% of the total saline affected soils in the country.



In addition to the mapping of land degradation, NBSSLUP and SLUSI are involved in soil mapping. NBSSLUP has prepared soil maps at 1:250,000 for the entire country, apart from five states where it is being carried out at 1:10,000 scale. It is expected to complete in five years.

SLUSI has also carried out rapid exploration of soil and land types for soil land runoff /erosion simulation in the framework of Sub/micro watersheds in 31 different river basins of the country covering 262 Mha land area at 1:50,000 scale through field verification. They have also designed and developed a methodology for the generation of district-wise Soil and Land Resource Inventory on a 1:50,000 scale through field ground-truthing using Remote Sensing and GIS techniques. District-wise identification of problematic soils has also been carried out. In

addition, soil quality assessment for evaluating soil health on 1:50,000 scale has been done for the Ministry of Agriculture and Farmers Welfare Soil Health Card Scheme. They were assessed using high-resolution satellite data (LISSIV/IKONOS/Sentinel) on 1:10,000 scale in selected priority areas. They are also working on village-wise identification of Physical degradation/ problematic soils at 1:10,000 scale.

The area of salinity affected soils as reported by SAC was 5.25 Mha (SAC, 2021), while the area reported by ICAR-CSSRI was 6.74 Mha in 1996.

The above data also bears the point that there are multiple estimates of degraded land/ land undergoing degradation processes, which presents challenges to the implementer in clearly identifying land to be treated to address land degradation.

1.5

Strategies Adopted for Achieving SLEM at the National Level

India has a long history of implementing programmes to tackle drought and land degradation, which have also addressed issues related to SLEM.

This section details some of the approaches being followed for sustainable land management in India and globally.

1.5.1 Watershed Development Approach

Watershed development programmes in India since the 1970s were instrumental in improving the productivity of rainfed areas, which represent almost 65 per cent of the cultivable area in India and 55 per cent of agricultural production and which, in the past, had experienced severe degradation due to heavy deforestation and unsustainable agricultural and livestock practices.

Over the past fifty years, through experiential learning, the approaches in watershed development programmes have evolved from being top-down, thematic, and technically oriented to being more ecosystem-based, participatory and holistic in nature.

Watershed development refers to the conservation, regeneration, and judicious use of natural resources (land, water, flora, and fauna) and humans – within the watershed

area. A watershed is defined as a geo-hydrological unit draining to a common point. The cornerstone of Watershed management is the 'Ridge to Valley approach' for land treatments which means initiating land treatments from the upper reaches having a higher slope and then treating the lower areas subsequently. The treatments reduce the speed of surface runoff, and therefore, the propensity of water to erode topsoil and help conserve groundwater. The watershed approach has demonstrated addressing land degradation primarily in wastelands, forests, and agricultural lands. The watershed plus approach adds livelihoods, integrated agriculture, horticulture and animal husbandry, and soil and water conservation.

In the 1970s, the Drought Prone Areas Programme (DPAP), the Desert Development Programme (DDP), and the



Integrated Wasteland Development Programme (IWDP), implemented by the Ministry of Rural Development (MoRD), focused on technical interventions to promote soil and water conservation measures in drought-prone areas.

In the 1990s and 2000s, various bilateral programmes, like the Indo German Watershed Development Programme (IGWDP), Indo Swiss Participatory Watershed Development Programme (ISPWDK) and DANIDA watershed projects involved NGOs in the watershed programme implementation. These programmes pilot-tested many innovative concepts and methodologies in participatory watershed development. Compared to large-scale government programmes covering hundreds of villages with low staff count, these bilateral programmes concentrated their funding in limited areas with adequate staffing and could create innovative models. Projects that promoted participation by villages were far more successful than those focused solely on technical interventions.

Between 2000 and 2010, financial outlays for watershed projects were enhanced. In addition to Central Government Ministries, National Bank for Agriculture and Rural Development (NABARD) also started investing in watershed development projects. The guidelines on watersheds were revised thrice to make the programs more socially inclusive and transparent. PRIs were given central space in the implementation of the watershed programmes. The guidelines also emphasized the involvement of women and SHGs in the programs. In addition, NGOs could participate in government-funded

watershed programmes as Project Implementing Agencies (PIAs). There was an emphasis on convergence with existing government programs to bring about holistic development in the programme area. The use of modern technology, especially remote sensing and GIS and IT-based management information systems for watershed planning and monitoring, was also emphasized in the different guidelines after 2000. The Integrated Watershed Management Programme was initiated in 2008 by merging the Integrated Watershed Development Project (IWDP), Desert Development Project (DDP) and Drought Prone Area Programme (DPAP) programs. In 2015, the watershed programme was integrated with the more extensive water-related programmes under the Pradhan Mantri Krishi Sinchai Yojana (PMKSY).

The sector also saw many states like Himachal Pradesh, Uttarakhand, Karnataka and Odisha implementing watershed projects with the help of Multilateral funding institutions like the World Bank and DFID. Learnings from these projects have played a significant role in shaping the watershed approach over the years.

The evolution of the watershed approach has also led to institutional developments concerning the key departments and community organizations anchoring the watershed projects on a large scale. Some of the key events and programmes in the history of watershed management are listed in Annexure 2.

1.5.2 Ecosystem Approach

The decision to prioritize the facilitation of the Ecosystem Approach was taken at the COP5 (CBD, 2000) of the Convention on Biological Diversity (CBD).

CBD defined 'ecosystem' as *"a dynamic complex of plant, animal and micro-organism communities and non-living environment interacting as a functional unit"*. Ecosystems are size and scale agnostic⁸. The context-specific issues and challenges determine the scale of analysis and action.

CBD defines the ecosystem approach as *"a strategy for the integrated management of land, water and living resources*

that promotes conservation and sustainable use in an equitable way".

Ecosystem approaches are highly context-specific and flexible to address management issues in different social contexts. However, the approach does follow the following principles:

- The objectives of management of land, water and living resources are a matter of societal choices.
- Management should be decentralized to the lowest appropriate level.
- Ecosystem managers should consider the effects

⁸ Defined by CBD



(actual or potential) of their activities on adjacent and other ecosystems

- Recognition of potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management programme should:
 - Reduce those market distortions that adversely affect biological diversity
 - Align incentives to promote biodiversity conservation and sustainable use
 - Internalize costs and benefits in the given ecosystem to the extent feasible
 - Conservation of ecosystem structure and functioning to maintain ecosystem services should be a priority target of the ecosystem approach
 - Ecosystems must be managed within the limits of their functioning.
 - The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.
 - Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.
 - Management must recognize that change is inevitable.
 - The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.

- The ecosystem approach should consider all relevant information, including scientific and indigenous and local knowledge, innovations and practices.
- The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

Ecosystem Approach of Sustainable Land Management:

Projects following an Ecosystem-based approach have been implemented in India mostly as multilateral donor pilot initiatives, funded by GEF, UNDP and the World Bank. FAO and German Federal Environmental Ministry (BMZ) are implementing an Ecosystem-based Adaptation (EBA) project for Climate Change Adaptation in India.

GIZ is implementing the Composite Water Resource Management Framework looking at comprehensive planning of soil, water, climate linkages to ecosystem. The transformation from water and soil conservation to sustainable land management can happen through ecosystem based comprehensive planning and management of resources.

Given the high potential of the approach to contribute to wholistic conservation and sustainable management as also for climate change adaptation, including addressing land degradation, it is expected that the learning from projects adopting the ecosystems-based approach will get scaled up and mainstreamed in the future policies at the National level.

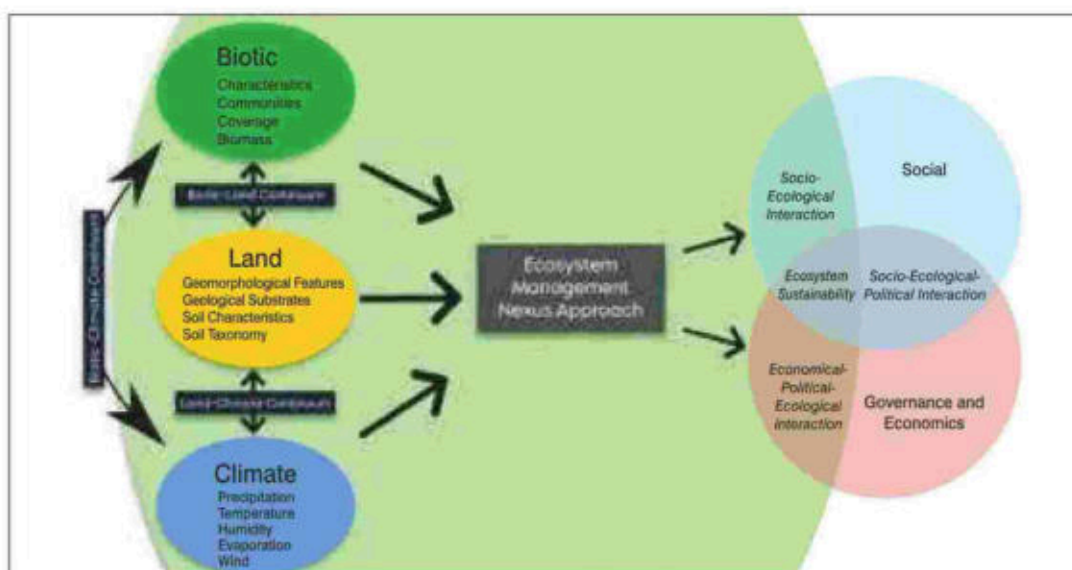


Figure 2. Ecosystem Approach for Sustainable Land Management



1.5.3 Landscape Approach

According to the Millennium Ecosystem Assessment 2005, a landscape is defined as "an area of land that contains a mosaic of ecosystems, including human-dominated ecosystems" (Hassan *et al.*, 2005).

The FAO defines the landscape approach as 'dealing with large-scale processes in an integrated and multi-disciplinary manner, combining natural resources

management with environmental and livelihood considerations' (FAO, 2012). The landscape-scale allows considering several land-use systems, for example, forests, agriculture, and livestock production, concurrently and in a more integrated manner, thus reconciling the stakeholders' various needs (ITTO, 2016).



Figure 3. Landscape Management Approach for Sustainable Land Management

The following ten principles of landscape approaches have been accepted by the Convention on Biological Diversity (Sayer *et al.*, 2013):

- Continued learning and adaptation
- A common concern entry point
- Multiple scales
- Multifunctionality
- Multiple stakeholders
- Negotiated and transparent change logic
- Clarification of rights and responsibilities
- Participatory and user-friendly monitoring
- Resilience

- Strengthened stakeholder capacity

The landscape-based approach has been used in India traditionally for Protected Area Management. However, in recent times, the process is also being used in some funded projects in the forestry sector. As a contemporary concept, learnings from landscape management projects will require replication in other locations through more extensive projects to get integrated into the National policies.

The landscape approach is also the cornerstone for the Green India Mission (GIM), one of the missions under the National Action Plan on Climate Change (NAPCC). GIM has been re-energized in 2016 and is the key programme implemented by the MoEFCC for achieving Land Degradation Neutrality (LDN)¹⁰.

¹⁰ From 2015 to 2020, 1.45 lakh ha of land has been covered under GIM with an outlay of Rs. 2.72 billion



Forest Landscape Restoration: Forest landscape restoration (FLR) is the ongoing process of regaining ecological functionality and enhancing human well-being across deforested or degraded forest landscapes. FLR is about using the mosaic of the landscape for retrieving ecological functionality – it is restoring a whole landscape to meet present and future needs and offer multiple benefits and land uses over time¹¹.

FLR integrates the following guiding principles¹²:

- **Focus on landscapes** - FLR is not specific to individual sites but covers entire landscapes for balancing ecological, social and economic priorities.
- **Maintain and enhance natural ecosystems within landscapes** - Applying FLR never leads to the destruction of natural forests or other ecosystems. FLR will lead to the recovery and sustainable management of forests and different ecosystems.
- **Engage stakeholders and support participatory governance** - Pertinent stakeholders, including vulnerable groups, are actively engaged in the landscape management processes- planning and decision-making regarding land use, restoration goals and strategies, implementation methods, benefit sharing, monitoring and review techniques in FLR.
- **Tailor to the local context using various approaches** - FLR is context-specific, and approaches adapted to the local, social, cultural, economic and ecological values, needs, and landscape history are adopted.
- **Restore multiple functions for multiple benefits** - FLR interventions aim to restore multiple ecological, social and economic functions across a landscape and generate a range of ecosystem goods and services that benefit multiple stakeholder groups.
- **Manage adaptively for long-term resilience** - FLR seeks to enhance the resilience of the landscape and its stakeholders over the medium and long term.

FLR aims to cover various landscapes, including forest land, agriculture land and protective lands and buffers.

The understanding is that FLR should also aim to restore multiple economic, social, and environmental functions in a landscape and to generate a wide range of ecosystem goods and services that equitably benefit stakeholders (ITTO, 2020).

Restoration Opportunities Assessment Methodology :

The Restoration Opportunities Assessment Methodology (ROAM), produced by IUCN and World Resources Institute, is a cost-effective and flexible framework to rapidly identify opportunities for forest landscape restoration (FLR) at a National or sub-National level. The methodology also generates context-specific knowledge relevant to forest and land-use planning and management and describes how the opportunities are related to food, water, and energy security.

The methodology helps in:

- Identifying priority areas for restoration before taking up FLR
- Creating a prioritized list of feasible restoration intervention types across the assessment area
- Quantifying costs and benefits of each intervention type
- Estimating values of additional carbon sequestered by these intervention types
- Analyzing the finance and investment options for restoration in the assessment area and
- Preparing a diagnostic of 'restoration readiness' and strategies for addressing major policy and institutional bottlenecks.

This approach was piloted in Uttarakhand in 2018, wherein a functional degradation map and landscape restoration opportunity assessment for the state was carried out through a multi-criteria spatial analysis, stakeholder consultations, and cost-benefit analysis. The learnings from the pilot are being incorporated in the project in Haryana, Karnataka, Madhya Pradesh, Maharashtra, and Nagaland (Bhattacharjee *et al.*, 2018).

¹¹ <https://infoflr.org/what-flr>

¹² <https://www.iucn.org/theme/forests/our-work/forest-landscape-restoration>



1.6

Accounting Environmental Effects of Economic Development

High GDP growth usually accompanies investment in physical infrastructure, which places increasing pressure on the country's environment and natural resources. Primary growth in the economy comes from the conversion and use of the natural resources like energy sources, minerals, soil and biodiversity. Economic growth leads to depletion of natural resources, externalizes costs of economic development like pollution and global warming, negative impact on health and inequitable growth of communities.

The traditional system of national accounting (SNA) i.e., the Gross Domestic Product is the most widely accepted and used methods in spite of its inherent flaws in not being able to account for the negative externalities due to economic development. GDP is not able to account for environmental goods or services which do not have a tradable market value. The traditional GDP method also does not take into account the future cost of cleaning or remediation of environmental damage. The depreciation of manmade capital is reflected in the GDP account but that of the natural capital is not.

For example, the ability of forests is not only to provide direct use values (timber, minor forest produce), but indirect use values also (provisioning of water, flood and drought control, carbon sequestration, and aesthetic value). Conversion of forests to agricultural lands and pasture loses much of that value. Conservative estimates of that loss of value based on a carbon value can be made and extended to all forest area which is capable of being lost to other uses – including protected areas, forest fringes up to a standard distance, and all isolated stands of forest including private forests, thickets in cultivated areas, sacred groves etc. However, incorporation of the valuation of forest resources on similar lines has remained difficult.

Fuelwood and NTFP which comprise a very significant part of the household incomes of forest or forest-edge dwelling communities is not necessarily captured by the economic value of forests. The value of NTFP can also be looked at as having a stabilizing role in sustaining livelihoods of local communities and as a means of poverty alleviation. Forest destruction burdens the government with the responsibility to provide alternative livelihoods for displaced communities.

Land has an infinite life if used sustainably. However, if unsustainable agricultural practices are followed, it would lead to land degradation due to soil erosion, loss of nutrients from topsoil, salinity, etc. In such case adjustment to income derived from agriculture is necessary to reflect the true net production from agriculture. Such adjustments are not reflected in the GDP.

'Green Accounting' or "Natural Capital Accounting" is a methodology for capturing the so-called 'externalities' of 'mainstream' economics (which include most material and unaccounted changes in natural capital, human capital, and social capital) by estimating their stock or net asset values, and thus bringing them within a common framework of value accounting for the nation.

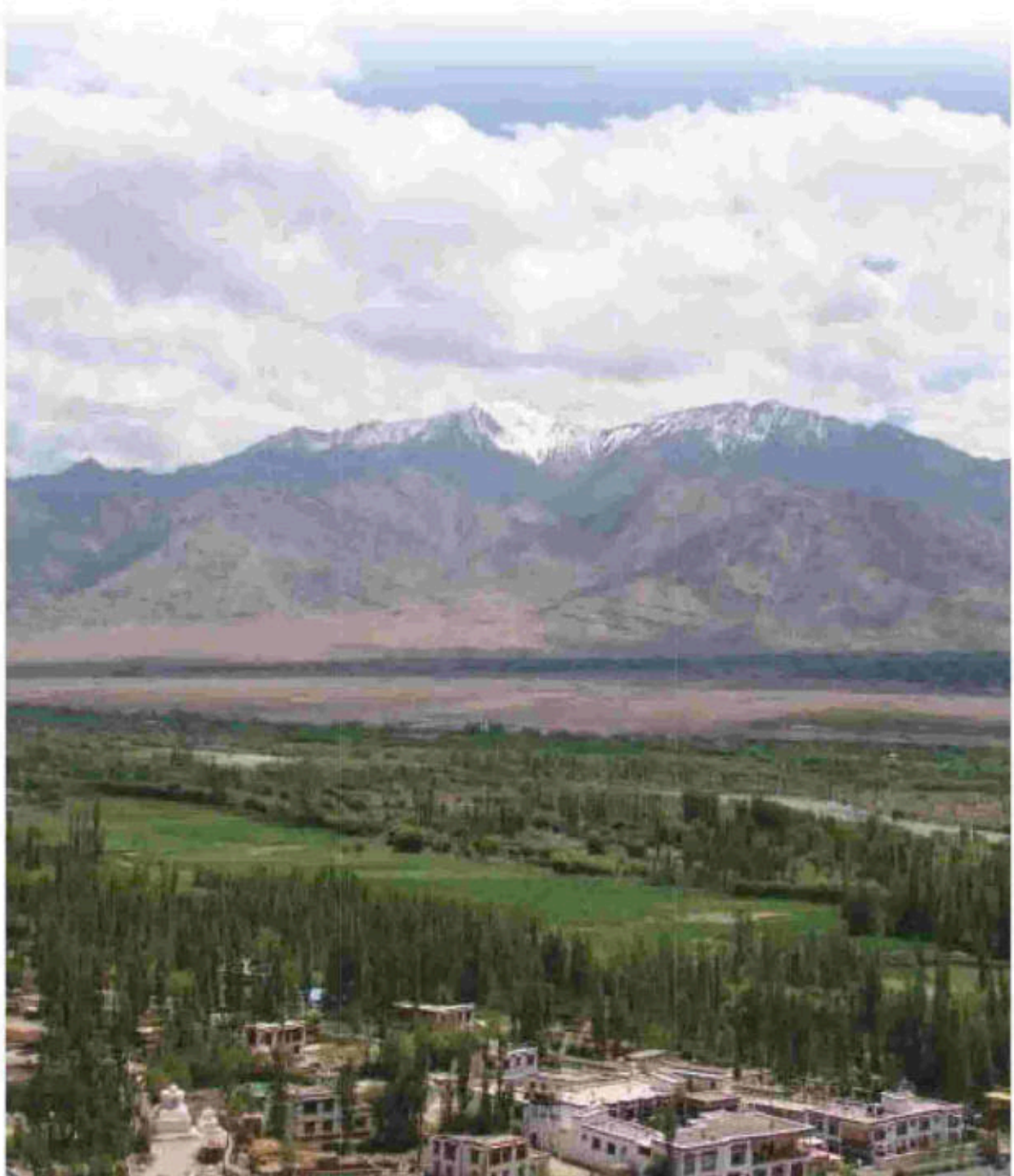
This problem of accounting has been under discussion globally since the 1980s. The UN Statistical Commission had developed a Framework for Development of Environment Statistics called FDES 1984. The natural capital accounting framework has been subsequently revised and the System of Environmental - Economic Accounting 2012 (SEEA)- Central Framework (UN, 2014) was brought out in 2014. The framework prescribes the methodology to capture the increase in economic products as well as the increase or decrease of the natural capital to give an overall view of the economic, social and environmental development.

The Ministry of Statistics and Programme Implementation (MoSPI) is the nodal department in the government tasked with preparation of the national accounting. The ministry had constituted an Expert Group under the Chairpersonship of Professor Partha Dasgupta, in 2011 to develop a framework of green national accounts and prepare a roadmap for India to implement the framework. The Expert Group submitted its Report in March 2013. Since then the ministry has also initiated the green accounting work through its EnviStats Report. The EnviStats India 2018 is a compendium of environment statistics, and also analyse the changes in stock of land, croplands, forests, wetland and biodiversity.



However, the data and changes taken into consideration are at a very broad levels, with local level changes (often drastic) are not fully represented. Attributing monetary value to the physical value of the stock changes has been a challenge. Thus, the rent value of producing GDP cannot be defined and netted off for true picture of green accounts.

The scale of the national level accounting being too large, sector by sector impact and account could be attempted in the future. A practical and well accepted green accounting methodology will bring the focus on addressing the externalities related to economic development and will **support actions to address** environmental degradation.



CHAPTER 2



Overview of Land Governance in India: Key Challenge in the Context of SLEM



Land governance is the process by which decisions are made regarding the use of land and natural resources and how those decisions are implemented, and conflict resolution mechanisms of varying competing interests are reconciled¹⁵. In India, the increase in land uses and conflicts over natural resources point towards incremental pressure on them. Effective land governance is thus a vital determinant for mainstreaming and sustaining SLEM measures.

Attempts have been made to assess the aspect of land governance in India. The Department of Land Resources had constituted a Committee on State Agrarian Relations and the Unfinished Task in Land Reforms¹⁶ in 2017. The Land Governance Assessment Framework (LGAF) developed by the World Bank is one of the tools available for self-assessment of land governance, which focussed on the five main thematic areas, namely (i) recognition of land rights (ii) land use planning (iii) management of public lands (iv) access to data and land records and (v) land allocation, diversion and conflict management¹⁷. Each of the thematic areas under the LGAF presents its own set of issues and challenges concerning land governance. The findings of the Task Force constituted by the Department of Land Resources and the assessment under the LGAF highlights land and forest governance issues, which remain unresolved owing to several factors, including the lack of coherence in policy

frameworks, the capacity of implementing agencies and coordination among them.

The bottlenecks for improving land governance are linked with the land reforms that involved legislation on land ceiling and tenancy by the states as a measure to ensure equity in land ownership and management. The issues related to poor land governance and the outcome of land reforms are also closely linked with land management.

The determinants of land governance affecting SLEM could be identified as follows:

- i) Constitutional dimensions on land which is the basis for the legislative, administrative powers of the central and state governments
- ii) Impact of land reform legislation
- iii) Impact of local self-governance institutions and decentralization, especially in the Scheduled Areas
- iv) The enactments on land acquisition and forest rights having a direct bearing on land administration and control
- v) Tenancy laws and proposed reforms around land leasing and land-use planning

The collective impact of these determinants spanning over the last many decades varies in different parts of the country because of geographical and institutional reasons. However, land governance in India continues to be driven by these factors and would impact the SLEM outcomes in the future.

2.1

Land Governance: Constitutional and Legal Dimensions

The Constitution of India delineates the legislative competence of Parliament and State legislatures regarding subject matters, including land and natural resources¹⁸. 'Land' was identified as a State subject¹⁷, and 'forests' a Concurrent subject¹⁸ under the Constitution. State governments have exclusive legislative and administrative jurisdiction over all aspects of land, including 'land

improvement' and 'land reforms', while the Central and state governments have legal and administrative jurisdiction over forest lands in India.

The Union government could also play a supporting, advisory and monitoring role concerning land governance under its economic and social planning functions, which is

¹⁵ United Nations Human Settlements Program (UN-HABITAT), 2008; https://www.landgovernance.org/assets/2014/07/NL_MinistryofForeignAffairs_Final-Version-LandInventory_06-12-2011_03.pdf

¹⁶ <https://dolr.gov.in/sites/default/files/Committee%20Report.pdf>

¹⁷ India Land Governance Assessment Framework, National Synthesis Report, 2015 <https://openknowledge.worldbank.org/bitstream/handle/10986/28513/119622-WP-P095390-PUBLIC-7-9-2017-10-7-28-NationalSynthesisReportIndia.pdf?sequence=1&isAllowed=y>

¹⁸ See Part XI, Article 246 of the Constitution of India

¹⁹ The Seventh Schedule to the Constitution of India, List -I: the State List, Entry, 18

²⁰ The Seventh Schedule to the Constitution of India, List -III: the Concurrent List, Entry, 17A



also a concurrent subject¹⁹. Importantly, as non-forest land is exclusively within the legislative and administrative domain of the state government, the central legislation on regulation, improvement and reforms in non-forest land is absent. There is, however, a plethora of legislation and revenue codes dealing with non-forest land at the state level, including the ceiling and tenancy laws that are subsequently discussed.

The other significant constitutional provisions, such as Article 21, Article 48 (a), and Article 51 (a)(g), have been the perennial source of the natural resource law and jurisprudence developed by various high courts and the Supreme Court of India.

2.1.1 Decentralization in Land Governance

The approach to decentralized land and natural resources management under the Constitution is through the empowerment of the local institutions. Thus, as per the Constitution, the municipalities (*Zilla Panchayats*) and the village level institutions (the Gram Panchayats) play an essential role in protecting, managing, and improving land, water, ecology, and environment within their local jurisdictions. The state government might enable the municipalities to function as institutions of self-government on subjects that directly relate to SLEM in municipalities or urban areas such as urban land-use planning and regulation, urban forestry, protection of environment and ecology, urban amenities such as parks, gardens and playgrounds by enacting legislation to this effect²⁰. However, as the Urban Local Bodies (ULBs) are not legislative bodies (but are deliberative bodies), they do not have any exclusive powers of their own. Their power domain is coextensive with a subset of the state's functional domain as the devolution of powers to the ULBs by the state government is optional and discretionary²¹. While the legal space for the decentralized land and NRM has been created, which could potentially be mobilized for SLEM, it is left to the states to give effect through legislation that remains to be done by the state governments.

The role and responsibilities of Village Panchayats under the Constitution are far more direct and elaborate concerning land and natural resource management. Panchayats could contribute to SLEM as the state legislature could endow them to regulate, manage and prepare plans and implement schemes with respect to agriculture, land improvement, land reforms, land consolidation, soil conservation, and water management and watershed development, among others. They could also be empowered to regulate and manage social and farm forestry, fisheries, minor forest produce, fodder, fuel and community assets.

The decentralized forest and scheduled areas governance in the country is guided by the Fifth and the Sixth Schedule of the Constitution, the provisions of Panchayat Extension to the Scheduled Areas (PESA) Act, 1996, and the Scheduled Tribes and Other Traditional Forest Dwellers Recognition of Forest Rights Act (FRA), 2006. The Sixth Schedule pertains to the four North Eastern States of Assam, Meghalaya, Tripura and Mizoram and recognizes tribal customary rights over land and other natural resources. These contemporary challenges concerning land governance are discussed briefly to provide context for the SLEM Roadmap.

2.2

Land Reforms: Land Ceiling and Leasing Laws have a Bearing on SLEM Measures

Land reforms in India mainly concerned private agricultural land, while the forest and common or government land such as grazing land remained out of the purview of land

reforms. The land reforms aimed at providing 'Land to the Tiller' by eliminating exploitative agrarian relations such as 'Zamindaars' towards increasing agricultural production

¹⁹ Seventh Schedule to the Constitution of India, List III: Concurrent List, Entry 20

²⁰ Article 243W and the XIIIth Schedule of the Constitution of India

²¹ Chaubey, PK, Indian Institute of Public Administration, 2003,

https://fincomindia.nic.in/writereaddata/html_en_files/oldcommission_html/predocs/speech/chaubey_ulb.pdf



and diversification of the agricultural economy. The ultimate aim of these reforms for private agricultural lands was to confer ownership rights to tenants to the largest possible extent. To realize these objectives, the state governments enacted ceiling and tenancy legislation to limit the size of private holdings and check the leasing of agricultural lands. In addition to this, land reforms also comprised the distribution of government wastelands, ceiling surplus and *Bhoodan* (voluntary donations by landlords). The redistribution of lands, particularly the so-called wastelands and voluntary transfer, continue to cause considerable confusion and pose administrative challenges due to the absence of land records.

Land Ceiling Legislations: Ceiling legislation enacted by many states aimed to carve out surplus land from the private individual ownership of landlords and redistribute it to the landless poor. The analysis of ceiling legislation in 12 states from all geographical regions in the country carried out under this study shows that the ceiling laws across various states vary in terms of the impositions of ceiling on land holdings and the exemptions to such imposition of the ceiling. For example:

- (i) In Uttar Pradesh, more than 20 acres of land is considered surplus land, and a tenure holder is allowed to keep 7.30 hectares (19 acres approx.)²⁵.
- (ii) In Bihar, ceiling limits on agricultural lands vary from 15 acres to 45 acres depending on land quality. Exceptionally, sugar cane farm owners can own up to 100 acres of land in Bihar. In other instances, private land ownership in Bihar goes up to 5000 acres rendering ceiling laws and land reforms ineffective²⁶.

In both the states (Uttar Pradesh and Bihar), religious and charitable institutions are exempted from ceiling limits and own large areas of productive agricultural lands. In the absence of proper land survey and

records, the exact nature of land use under the exempted categories remains unknown.

- (iii) In Punjab and Haryana, productive lands with high yielding capacity are held by institutions exempted under the ceiling laws²⁶.
- (iv) In Rajasthan, the ceiling limits vary from 18 to 174 acres²⁵. However, the productive lands are misappropriated by vesting them with charitable endowments or agricultural cooperative societies that are exempted, but the actual control remains in the hands of erstwhile landlords or their descendants.
- (v) In Andhra Pradesh, of the total 11 classifications, eight types of agricultural lands are exempted from applying the state ceiling law²⁶. It offers a rich scope to evade the ceiling as landholders can easily bring their lands in one of the eight exempted categories.
- (vi) Similar trends are noticed in Tamil Nadu, Odisha and West Bengal. However, in West Bengal, land ceiling and reforms have been implemented strictly, whereas only a few areas where lands possessed as Raiyat by the government and in hilly regions such as Darjeeling were exempted²⁷.

Tenancy Legislations: The variations in ceiling laws and their ineffective implementation have impaired the security of tenure for the landless, thus defeating the very purpose of land reforms through ceiling laws. The productive land resources held by organizations and institutions may not necessarily be putting land resources to their optimum productive uses for various reasons such as the lack of technical capacity, workforce or intent, thereby excluding large productive areas of land from the purview of integrated land use planning.

Similarly, tenancy legislation not only differs in varying degrees in terms of the regulation of tenancy, but these also provide for exceptions²⁸. For example:

²⁵ Section 5, the Uttar Pradesh Imposition of Ceiling of Land Holding Act, 1960

²⁶ Current Agrarian Situation in Bihar, the Asian Development Research Institute (2008); https://www.adriindia.org/images/monographs/1505827665Current_Agrarian_Situation_in_Bihar.pdf

²⁷ Section 5 A, The Haryana Ceiling on Land Holding Act, 1972

²⁸ Section 4, Rajasthan Imposition of Ceiling on Holding Act, 1973

²⁹ See Part XI, Article 246 of the Constitution of India

³⁰ West Bengal Land Reforms Act, 1955

³¹ The tenancy legislations in India precede the enactment of land ceiling legislations and institutional attempts to improve land governance and present certain special challenges with respect to transfer, alienation and overall a Scheduled Areas Regulation, 1969 provide for a special framework on rights over land resources. These laws provide an additional regime of tribal or indigenous people's customary community rights in common land including community ownership of forest lands and prohibit the transfer of land to non-tribals. The CNT Act is one of the most important legislations in Jharkhand as it not only provides for the creation and maintenance of land records, but it creates a special tenure category of "Mundari Khuntkattidar" (the original owners of lands in the area). The transfers of this category of lands are severely restricted to non-tribals. The CNT Act goes beyond land and provides for the recording of various customary community rights on other natural resources such as water and water bodies, rights to take forest produce from jungle, grazing rights and importantly rights to reclaim 'jungle or wasteland' into Korkar or rice growing fields



- (i) While land tenancy is prohibited in Karnataka, it's allowed in Punjab and Haryana. West Bengal provides owner-like rights only to the sharecroppers.
- (ii) Tenancy laws also differ for different regions or districts, such as in Maharashtra and Odisha. In Odisha, certain limited groups or categories of people broadly classified as 'disabled', including a landowner owning less than 3 acres of land, widow, unmarried or separated woman, are allowed to lease land under tenancy laws. In Rajasthan, a student pursuing studies in an educational institution and less than 25 years old is also a disabled person. In Uttar Pradesh, such a student has been included if his/her father has died. All minors, women and unmarried daughters in UP are not treated as disabled unless their husband or father has died. In Bihar, a public servant whose salary is below the given norm is treated as disabled.
- (iii) However, in states where the tenancy is completely banned, it is faced with criticism, and the restrictions have led to the emergence of a refractory tenancy market where various forms of tenancy such as concealed and reverse tenancy exist.

Restrictions on leasing land are directly linked with land and agricultural efficiency in several ways. Informal tenants are most insecure, as they either have short duration oral leases or get rotated from plot to plot each year so that they cannot prove continuous possession of any particular piece of land for any specified period, which could give them occupancy right, according to the law of a state. It provides a disincentive to tenant farmers to make any investment in land improvement for productivity enhancement.

Significantly, due to legal restrictions, many landowners prefer to keep their lands fallow, resulting in underutilization of land and loss of agricultural output and associated ecosystem services.

Thus, while considerable attention has been paid to legal reforms aimed at redistributing land, little attention has been paid to ensure its sustainability. As a result, land acquisition and ceiling laws were mobilized to acquire, redistribute and vest land either with government or the landless while the

planned land use and its sustainable management lagged and continue to undermine the sustainable land utilization and productivity having a bearing on soil conservation and sustainable land use and management

In view of the potentially positive impact of lifting the ban on tenancy, the Model Agriculture Land Leasing Act, 2016, has been brought out by the Niti Aayog to bring leasing and tenancy reforms and improve the quality of land, among other aspects²⁹. These proposed land reforms will have a direct bearing on the management and maintenance of land ecosystems, thus creating room for SLEM measures, directly and indirectly.

Land Acquisition: The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013, commonly known as the LARR Act, which has replaced the Land Acquisition Act of 1894, governs land acquisition in India. An essential aspect of the new land acquisition law is its due process of land acquisition for a public purpose. The LARR Act has following elements that bring a paradigm shift in how private agricultural land or habitations were acquired for a public purpose:

- i) It treats land acquisition and rehabilitation and resettlement (R&R) as one unified process making R&R compulsory
- ii) Enhanced compensation not only to land-owning farmers but to non-owners facing a loss of livelihoods due to such acquisition
- iii) Mandatory Free Prior Informed Consent (FIPC) of the Gram Sabha of land acquisition in the Fifth Scheduled Areas³⁰
- iv) Mandatory prior consent of the affected families when the acquisition involves a private section. It assumes significance as faulty land acquisition or acquisition without concomitant resettlement has become a cause for forest and agricultural land degradation.

Another notable aspect of the LARR Act which is very pertinent for SLEM is that under the Act, 'land' includes benefits to arise out of the land, and things attached to the

²⁹ NitiAyog, Report of the Expert Committee on Land Leasing, 2016
http://www.niti.gov.in/writereaddata/files/document_publication/Final_Report_Expert_Group_on_Land_Leasing.pdf ; also see
https://niti.gov.in/writereaddata/files/document_publication/NITIBlog2_VC.pdf, accessed on 15.01.2021

³⁰ Section, 41, Special Provision for the Scheduled Castes and Scheduled Tribes, The LARR Act, 2013



earth or permanently fastened to anything attached to the earth³¹ but does not include the ecological values of land in terms of the services provided by it. It indicates that the ecosystem services provided by land are still not accounted for or tethered to land under domestic law,

contrary to the definition adopted under UNCCD of land to include water and other ecosystem services³². Disconnection of land from the ecosystem services it provides causes legal issues in assessing the ecological value of the land.

2.3

SLEM in the Context of Powers of the Local Self-Government Institutions in Special Governance Areas

2.3.1

SLEM in the Fifth Scheduled Areas and Powers of the Local Bodies on Natural Resource Management

Article 244 (1) of the Constitution of India provides special protection to the Scheduled Areas inhabited by the country's scheduled tribal communities directly dependent on land and its resources. The Scheduled Areas are listed under the fifth schedule and may comprise an entire district or blocks within a district or Panchayats or villages. Historically, the remote and backward areas with a predominant population of scheduled tribal communities living according to their customs and traditions were excluded or partially excluded from the regular operation of laws. In pursuance of Article 40, which calls upon the empowerment of local village bodies or Panchayats read with the Fifth Schedule, a central legislation, the Provisions of the Panchayats (Extension to the Scheduled Areas) Act, 1996, commonly called PESA, was enacted to further safeguard the nature dependent traditional vocations of tribal communities living in the Scheduled Areas. As a special law, PESA vests legislative powers in the Gram Sabha (Village Assembly at the hamlet level), especially in development planning, management of natural resources and adjudication of disputes as per traditions and customs. Thus, autonomy or a self-governance framework for managing land and natural resources by the Gram Sabha in the PESA villages is directly relevant for SLEM measures in the Scheduled Areas. However, the distribution of powers between the Gram Sabha and Panchayat at the appropriate level (PAL) becomes critical for SLEM measures, for example, agroforestry or plantations or nature-based solutions in the PESA areas.

The PESA provides certain exclusive powers to Gram Sabha to approve developmental plans and projects, beneficiary selection for poverty alleviation programmes and granting utilization certificates for the programmes implemented by the Panchayat. Thus, the Gram Sabha or PAL shall be consulted before land acquisition for development projects and rehabilitation of persons affected by projects; prior recommendation of the Gram Sabha or PAL is required for granting of prospecting licence or mining leases for minor minerals and for granting of concessions for the exploitation of minor minerals by auction. In the matters that directly concern tribal life and subsistence, such as alienation of land in the Scheduled Areas, the ownership of minor forest produces and regulation on the sale or consumption of intoxicants, management of village markets, local plans, including tribal sub-plans, both Gram Sabha and PAL are empowered to regulate. These aspects become very pertinent not only from the perspective of Scheduled Area governance but also for incorporating SLEM measures into tribal area planning and implementation through schemes and socio-economic development programmes that will be routed on the ground as per the land and NRM governance framework under PESA.

It is also pertinent to note that while powers to regulate land alienation, land acquisition, minor forest produce, and minor water bodies are provided, the mandate and responsibility for sustainable land management and its resources under PESA are missing.

³¹ Section 3 (p), The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013

³² Article 1 (e), "Land" means the terrestrial bio-productive systems that comprises soil, vegetation, other biota and the ecological and hydrological processes that operate within the system.



According to PESA, different states have attempted harmonizing the state panchayat law with the spirit and provisions of PESA. For example, the Orissa Scheduled Areas Transfer of Immovable Property (By Scheduled Tribes) Regulation, 1956, under its 2002 amendment, entirely bans the transfer of immovable property (land) of Scheduled Tribes to non-tribal in the Scheduled Areas.

In Madhya Pradesh, the *Panchyati Raj Evam Gram Swaraj Adhiniyam* (PRGSA), 1993, has been amended to

conform to the spirit of PESA and to extend the Panchayati Raj system to the Scheduled Areas of Madhya Pradesh. Confirming to central PESA, PRGSA defines a village and empowers the Gram Sabha in socio-economic developmental matters. Importantly, land acquisition in the Scheduled Areas of Madhya Pradesh cannot be made without consultation with the Gram Sabha or PAL as the state Panchayat law also provides provisions complementary to PESA.

2.3.2

SLEM in the Sixth Schedule Areas and the Powers of the Autonomous District Councils and Village Councils on Natural Resources Management

The Sixth Schedule of the Constitution empowers the Autonomous Regional Councils (ARC) for different tribes living in a region and Autonomous District Councils (ADCs) for tribal communities in the four North Eastern States of Assam, Meghalaya, Tripura and Mizoram to maintain the cultural identity and customary natural resource governance that includes community land ownership. The ADCs are thus constitutionally empowered to make laws concerning land and natural resources, including the regulation of Jhum (shifting cultivation), water, fisheries and forest, except reserve forest notified by the state government.

Due to the special constitutional and legal position³³, the control and management of natural resources in the North Eastern Region of India are governed by the three sets of legal and policy instruments that empower institutions at the regional, state and local/autonomous district level. However, natural resources are primarily controlled and governed under the customary laws by the local institutions recognized by the Autonomous District Councils in the four states of Assam, Meghalaya, Mizoram and Tripura and Village Councils in Nagaland and Manipur at the hill district level. Therefore, the six North Eastern states are remarkably different in their policy and institutional governance of natural resources. The state governments have also adopted various policy and legal instruments for NRM at the state level.

Based on the Constitutional recognition of special tribal customs and rights over resources of India's most forest-dependent hill communities and their traditional institutions in the north eastern regions physically control and manage at least two-thirds of the region's forest resources³⁴. The exercise of considerable legal authority by indigenous community institutions such as village councils, chieftainships, and councils of elders based on the customary rules constitute a framework for the management of forests in North East India³⁵. In the four North Eastern States of Assam, Mizoram, Meghalaya and Tripura, the Sixth Schedule empowers the tribal people through ADCs for exercising legal control over forest management or utilization. Similarly, in the non-Scheduled States of Manipur and Nagaland, Village Councils or traditional village level institutions control a significant chunk of forest areas. The application of Acts of Parliament and state legislation also varies from state to state and sometimes from district to district within the same state. However, limited in scope, certain state legislations are pertinent to understand indigenous people's rights over forest resources in the six states.

In Meghalaya, state-led forest management is regulated by the Assam Forest Regulation, 1891, as adopted by Meghalaya vide the Meghalaya Forest Regulation (application and amendment) Act, 1973. The need for

³³ For a comprehensive overview of the Constitutional Provisions for the North Eastern States see <http://necouncil.gov.in/northeastindia/constitutional-provisions>

³⁴ Indigenous Forest Stewards of North East India, Community Forestry International, 2004

³⁵ Polfenberger, Mark, Communities and Forest Management in North East India, Community Forestry International, 2004



having unified control of forests led to the enactment of the Meghalaya Forest Authority Act, 1991, directing the state government to constitute an authority comprising the Chief Minister, Minister in Charge of Forest and Environment and the Chief Executive Members of the Autonomous District Councils of the state. This authority is empowered to advise the state government in the preparation of forest plans and schemes, coordination and implementation of forest laws, and is connected to the preservation of the forest, which are primarily under the control of the state government. In addition to this, the ADCs in Meghalaya have their local Forest Acts that apply within the hill districts and are the primary source of control and management over a significant chunk of forest resources in Meghalaya. For example, in Meghalaya, the laws concerning forest ecosystems at the ADC level, namely the Garo Hills (Jhum) Regulation, 1954, the United Khasi-Jaintia Hills Autonomous District (Management and Control of Forests) Act, 1958, and the Rules, 1960, the Garo Hills District (Forest) Act, 1958, the Khasi Hills Autonomous District Council (Management and Control of Forests, Revised Rates of Royalty) Rules, 2005, are 'Tree' centric aimed at regulating use and extraction of timber primarily from forest lands. A large segment of the forests is under community and private control and is thus subject to degradation for multiple reasons, including community and private ownership structures. The penalties under the ADC forest laws are also ineffective to prevent violations leading to the loss of natural forests and associated water and food insecurity. The legal spaces concerning the restoration and arresting drivers of deforestation through conservation and participatory forest resource management are missing from the ADC forest laws.

In Nagaland, Forest governance is driven by a unique land ownership system governed by tribe-specific customary laws and traditions and has been roughly brought under the institutional framework of Village Councils by the State Government. Land and its resources, including water and biodiversity, are controlled by individuals, families, clans, chieftains or communities under this traditional system. With over 88 per cent of forests in private, community or

village ownership, the role of these entities in the management and conservation of forests is predominant. Specific state regulations include the Nagaland Forest Act, 1968, the Nagaland Jhumland Act, 1970, and the Nagaland Tree Felling Regulations, 2002. The Forest Conservation Act, 1980, has been extended to Nagaland state in respect of the Government Reserved Forests and other Forests and Wildlife Sanctuaries under the control of the State Government. Nagaland has recently adopted the Land Use Policy and the State Water Policy to make Jhum sustainable. However, SLEM interventions will require capacity building and alternatives, especially in terms of cultivation and livelihoods.

In Mizoram, in addition to the community management of forest through ADCs, the *New Land Use Policy (NLUP), 2018*,³⁶ has been specified in the news for adopting strategies that are effective in the long term for reversing the rate of rapid forest land degradation and soil diminution. The main focus of the NLUP is to wean the communities away from shifting cultivation that has been the leading cause of ecosystem loss and degradation in the state and provide them with customized, permanent and stable alternatives. Creating self-sufficiency in the production of rice and vegetables is paramount in the state. Developing land for wet rice cultivation is another goal that can have implications for water resources as that would require an irrigation infrastructure through pipes and canals in the hilly state throughout the year. Since the loss of soil cover also leads to heavy siltation of rivers and streams, NLUP's linkages with rivers and water governance in the state are inevitable. The NLUP aims to regenerate ecosystems that will help the state for climate adaptation³⁷ through the ecosystems approach.

Water Governance in the North Eastern States: Water and land in NER are closely linked as the region predominantly practices rain-fed agriculture known as the Jhum Cultivation, which is directly connected to the loss of forests. Though all the north eastern states, except Tripura,³⁸ have formulated state water policies that reflect principles and approaches outlined in the National Water Policy, 2012, their implementation face challenges as it is difficult

³⁶ <https://nlup.mizoram.gov.in/> The whole text of the NLUP is not available in the public domain as on 28.06.2021

³⁷ <https://www.sciencedirect.com/science/article/abs/pii/S0264837718306586>

³⁸ The information on Tripura Water Policy is not available on any of the official websites as on 28.06.2021



to find coherence and synergy in the customs, policy approaches, goals and targets among all the six states. The water policies adopted by each of these states are

relatively new and are in various implementation phases, which provides an opportunity to strengthen policy initiatives through a useful approach such as SLEM.

2.4

Forest Governance

The Indian Forest Act, 1927, the Wildlife (Protection) Act, 1972, and the Forest Conservation Act of 1980 govern the forests of India. These Acts define the management and protection of forest areas. The National Forest Policy (NFP), 1988, explicitly acknowledged the roles and needs of the forest-dependent communities in conserving and managing forests. Accordingly, Joint Forest Management was promoted by the central and state government. However, traditional rights over forest lands were not shared with the communities living in and around the forests until the Scheduled Tribes and Other Traditional Forest Rights Act of 2006 (FRA) came into effect.

The FRA recognizes and vests the occupancy rights with the forest-dependent scheduled tribes living or dependent on

the forests for subsistence needs. In addition to the individual household-self cultivation-based rights, the FRA also provides for Community Forest Rights over Community Forest Resource, defined under the FRA. It marks a fundamental shift in the ownership, control, and management regimes over forest land as the FRA strengthens the Gram Sabha (village council) to record rights and determine individual and community forest rights. However, the law presented many ground-level challenges concerning the CFRs, for which the Ministry of Tribal Affairs, Government of India,³⁹ has formulated guidelines and increased pressures through encroachment to secure rights under the FRA.

2.5

Governance of Common Lands

Common lands are not legally defined in India though many are recognized under local laws. The National Sample Survey Organization (NSSO) defines common lands as those situated within a village's boundary held by the village Panchayat or community. They may include grazing land, village forest and woodlot, village thrashing sites. However, grazing lands constitutes one of the most important Common Property Resource of a village and is a well-defined legal category of land in various state-level revenue laws and land records and are mentioned in several other names such as *gauchar*, *gochar*, *gairan* and *gomol*, among others.⁴⁰ The Draft National Land Reforms Policy, 2013,⁴¹ attempted rights-based criteria to define common land for the first time. The policy provides that common land is where all the identified community members enjoy common inalienable use rights. However,

the policy is still a draft and has not been formally accepted by the government. In the Scheduled Areas, local self-government institutions are empowered to safeguard and preserve community resources that include common lands of all categories. By some estimates, common property resources constitute a substantial land area of the country but are under severe pressure and are shrinking at a fast pace. Restoration of these lands is necessary for common uses and fodder security in rural India and thus requires SLEM interventions. In 2011, the Hon'ble Supreme Court of India (Civil Appeal No.1132/2011 @ SLP (C) No. 3109/2011) directed all state governments to prepare schemes for the eviction of encroachers on common lands and their restorations⁴². However, the progress on its implementation is not known publically.

³⁹ https://tribal.nic.in/downloads/FRA/Draft_Report06012021.pdf

⁴⁰ For example see Section 39, the Bombay Land Revenue Code, 1879, as applicable in Gujarat

⁴¹ <http://doir.nic.in/doir/downloads/pdfs/draft%20National%20Land%20Reforms%20Policy%2024-Jul-2013.pdf>

⁴² Jaggal Singh and Others Vs State of Punjab &Ors, CA 1132



2.6

Institutional Reforms on Land Governance: Need for the Revival of State Land Use Boards

In 1985, in addition to the National Land Use and Wasteland Development Council (Ministry of Rural Development and the National Afforestation and Eco-Development Board (Ministry of Environment, Forest and Climate Change), the National Land Use and Conservation Board (NLCB-Ministry of Agriculture and Farmers Welfare) was set up to perform the role of the highest policy planning and coordinating agency for all issues concerning the land resources in the country. Among these, the NLCB had the mandate to look after the health of land resources. Like NLCB, State Land Use Boards (SLUBs) were set up with the mandate to prepare prospective plans, adopt land-use policies, and bring appropriate legislation to implement the SLUB mandate. The institutional response to streamlining land use to ensure the health and sustainability of land resources could not create any impact, especially at the states' implementation level. It was primarily because the SLUBs were created as non-statutory agencies with no legal or financial autonomy to transform them into institutions that would bring any substantive reforms in the qualitative aspects of land resource management.

It can be seen that land acquisition in India is significantly influenced by legal pluralism, where it is held between the states, central, local, common, commune and customary laws and institutions. Thus, the future of land governance lies in improved interactions and interface of these laws and institutions that require synergies and harmonization for achieving sustainability. Some bigger challenges for non-forest and forest lands include sustainable management of common lands through scientific interventions, planning and participation, reduced extractive uses, and fuel-fodder dependence on forest lands for which development of common land is necessary. In the absence of land-use planning at the national and state level, creating a balance between various competing and conflicting land uses is a challenging task. Better usage of policies by the institutions and specific actions is key to sustainable and improved land governance, which can be achieved through SLEM.



CHAPTER 3



**Policy and Legislative Framework Related to SLEM in India:
Key Challenge in the Context of SLEM**



The contours of land administration in India, which have evolved over centuries, define the relationship that the owner or occupier of the land enjoys with the benefits arising from the land. This relationship influences the incentives and disincentives, especially in the context of SLEM. The land administration system codified in the

statute also defines the interrelationships of multiple agencies responsible for managing resources. The policy and regulatory framework for environmental protection and those governing land defines the instruments relevant for implementing SLEM in India.

3.1

Current Policy and Legal Landscape with respect to SLEM

India has a long history of policy and legislation enacted for protecting the environment and managing natural resources sustainably. The key Acts in this regard are the Indian Forest Act of 1927, Wildlife Protection Act of 1972, Water (Prevention and Control of Pollution) Act of 1974, Forest (Conservation) Act of 1980, Air (Prevention and Control of Pollution) Act of 1981, Environment Protection Act of 1986, Biodiversity Act of 2002, and Compensatory Afforestation Fund Act of 2016.

In addition, there are other Acts like the Mahatma Gandhi National Rural Employment Guarantee Act 2005, Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act of 2006 (FRA Act), and The Panchayat (Extension to the Scheduled Areas) Act of 1996, which have far-reaching impact in the sector.

Some of the key policies are National Forest Policy of 1988, National Agriculture Policy of 2000, National Tourism Policy of 2002, National Environmental Policy of 2006, National Policy for Farmers of 2007, National Biodiversity Action Plan of 2008, National Water policy of 2012, National Agroforestry Policy of 2014, National Biofuel Policy of 2018, and National Mineral Policy of 2019. These set goals provide a direction for the state's actions. It may be mentioned that the policy space continues to evolve with amendments and replacements in policy provisions to cater to the current challenges and priorities.

Natural resources such as land, water, forests, and biodiversity and sectors such as agriculture and fisheries are treated differently under the Seventh Schedule of the

Constitution of India. Land, water, and agriculture are on the State list. Forest and protection of wild animals and birds come under the Concurrent List, with both the Union and states having jurisdictions on the subjects. Subjects such as mine and mineral development of specific resources and fisheries beyond territorial boundaries feature on the Union List.

There is further distribution of subjects with the local bodies as per the Constitution's Seventy Third and Seventy Fourth Amendment. The Seventy Third Amendment Act of 1992 transferred land-related subjects to the Panchayati Raj Institutions (local self-governments) at the village, block, and district levels to ensure participatory planning, decision making, and monitoring of programmes by the local self-government. The Seventy Fourth Amendment Act, 1992, transferred powers over the regulation of land use and urban planning to the urban self-governing bodies.

The Indian Union also has more resources than the states and has traditionally been funding interventions in the areas listed on the State List. As a result, the Union also influences matters purely in the domain of states. Therefore, the constitutional and financial arrangement in the country has also played a role in shaping the policy space concerning natural resources and the environment in general, of which SLEM is an integral part.

Various policy instruments pertinent to SLEM have been listed in Table 3.



**Table 3. Categorization of policies and legislations within the various sectors related to SLEM**

Sector	Policies	Legislations
Environment	<ul style="list-style-type: none"> National Conservation Strategy and Policy Statement on Environment and Development of 1992 Policy Statement on Abatement of Pollution of 1992 The National Environment Policy of 2006 The National Action Plan on Climate Change of 2008 	<ul style="list-style-type: none"> The Environment (Protection) Act of 1986 The Environment Impact Assessment Notification of 2006 The Coastal Regulation Zone Notification of 2019 The Wetlands (Conservation and Management) Rules of 2017 Notifications on Ecologically Sensitive Areas (several) issued under the EPA of 1986 The Solid Waste Management Rules of 2016 The Notification on Utilization of Fly Ash of 2016 Plastic Waste Management and Handling Rules of 2016
Forests and Biodiversity	<ul style="list-style-type: none"> National Forest Policy of 1988 The National Biodiversity Action Plan, 2008 and the Addendum to the NBAP of 2014 	<ul style="list-style-type: none"> The Indian Forest Act of 1927 The Wildlife (Protection) Act of 1972 The Forest (Conservation) Act of 1980 The Protection of Plant Varieties and Farmers' Rights Act of 2001 National Biodiversity Act of 2002 National Biodiversity Rules 2004
Water	<ul style="list-style-type: none"> National Water Policy of 2012 	<ul style="list-style-type: none"> The Water (Prevention and Control of Pollution) Act of 1974 The Water Cess Act of 1977 The Model Groundwater (Sustainable Management) Bill of 2017
Agriculture and Farmers Welfare	<ul style="list-style-type: none"> National Agroforestry Policy of 2014 National Agriculture Policy of 2000 National Policy for Farmers of 2007 The National Land Utilization Policy of 2013 	
Rural Development		<ul style="list-style-type: none"> The Mahatma Gandhi National Rural Employment Guarantee Act of 2005
Mineral	<ul style="list-style-type: none"> National Mineral Policy of 2019 	<ul style="list-style-type: none"> Mines & Minerals (Development & Regulation) Act of 1957 (As amended up to 2016) Mineral Conservation and Development Rules of 2017 (As amended up to 2018)
Panchayats		<ul style="list-style-type: none"> The Panchayati Raj Act of 1992 Panchayat (Extension to Scheduled Areas) Act of 1996
Tribal		<ul style="list-style-type: none"> The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act of 2006 (Forest Rights Act of 2006) and the Rules of 2008
Others		<ul style="list-style-type: none"> The Transfer of Property Act of 1882 Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act of 2013 The Easement Act of 1882



The policy landscape catering to the theme of SLEM is vast. Policies identified as above have been looked at from the perspective of how central their objectives are to SLEM from three aspects, namely Institutional, Social and Land Management and are based on parameters such as core objectives, specific components related to SLEM, implementation and operational mechanism, equity,

inclusion and gender mainstreaming, intersectoral linkages and convergence and community participation. The policies were also looked in the perspective of how they influence the drivers of land degradation.

The outcome of the analysis has been summarized as under:

3.2 Policy Analysis

3.2.1 National Forest Policy, 1988

The forest policies in India set up important guidelines to maintain the forest, their resources and interactions with other land use. The Forest Policy 1988 shifted the focus away from production to the maintenance of environmental and ecological stability and the motivation of the people to increase and protect forests⁴³. It set a milestone in changing the perception of the forest from timber production to forest protection and was followed by community-based social forestry bringing a change in perspective towards forest resources. The policy has acted as the foundation for various judicial pronouncements of the Supreme Court, defining the frontiers of forest management in the country.

Key Features Relevant to SLEM:

- **Afforestation** – Setting a national target of covering 33% of the land under forest and tree cover through massive afforestation and social forestry programmes, especially on all denuded, degraded and unproductive lands and tree plantation on unutilized land like alongside road, railway lines and rivers
- **Community participation** – Emphasis on plantation in the village and community land and people's participation in forest management
- **Restrictions in the land diversion** – Diversion of forest land for any non-forest purpose is subject to the most careful examinations by specialists from the social and environmental costs and benefits point of view
- **Discourage shifting cultivation** – Alternative avenues of income, suitably harmonised with the proper land-

use practices, should be devised to discourage shifting cultivation.

- **Mitigating soil erosion** – Checking soil erosion and denudation in catchment areas of rivers, lakes and reservoirs
- **Mitigating desertification and land degradation** – Checking extension of dunes in desert areas of Rajasthan and along coastal tracts
- **Wildlife conservation** – Provide wildlife corridors linking protected areas
- **Forest and tribal development** – Tribal and labour cooperatives and development of forest villages on par with revenue villages
- **Regulation of forest-based industries** – Natural forests cannot be made available to the industries, restriction on forest-based industries, industries to raise their raw material and end the practice of concessional supply of raw material to industries

Several events have shaped the sector's trajectory after the National Forest Policy of 1988 came into effect. They are:

- As Joint Forest Management (JFM) was mainstreamed into Forest management, JFM guidelines were introduced in 1990. The JFM Committees (JFMCs) were formed across the country, involving the community in protecting forests. It has resulted in sporadic success, mainly due to the inability to sustain the initiative. However, people's participation as the core of forest management has been widely accepted.

⁴³ <http://www.fao.org/3/XII/0729-C1.htm>



- Felling in forests came under the intense scrutiny of the higher judiciary, and the Working Plans were given official sanctity. The ban on the felling of trees in the Himalayan states in 1995 changed the objectives of management across several forest divisions in the hill States, though felling was allowed by the courts in some selective circles after 2010 as per approved working plans.
- Investments in Forests through externally-aided projects have gained prominence since the 1990s and continues till date.
- The FRA 2006 and PESA 1996 were landmark legislation that empowered the communities or traditional community institutions such as Gram Sabhas with rights over the forests.
- The growing importance of climate change in policy circles from 2000 onwards put forests at centre stage as a carbon sink in mitigation and adaptation strategies. Forests have gained a prominent position as a carbon sink in NDC forestry target under the Paris Agreement.
- Green India Mission was formulated as one of the eight missions proposed under the NAPCC in 2008 that focussed mainly on forests.
- The utilization of funds collected from user agencies under the Forest Conservation Act was streamlined through the formation of an adhoc CAMPA in 2004 due to the Supreme Court's intervention. Subsequently, CAMPA was formalized through a statute in 2018.
- The new National Forest Working Plan Code was released in 2014 and addresses some of the topical issues that forests face, such as climate change, management of forests on watershed principles and use of technology.
- The national forest inventory initiative was strengthened through regular publishing of the State of Forest Report using better methodologies and technologies. Better data from forest cover assessments brought out the gains made in tree cover outside demarcated forest areas putting agroforestry and tree farming as a policy thrust area.

The impacts of the policy on the drivers of land degradation are summarized below:

Drivers of land degradation	Supporting provisions
Illegal felling and unsustainable harvesting of forest produce	<ul style="list-style-type: none"> • Sustainable forest management involvement of local communities in forest management and protection with provisions of usufruct rights capacity building
Encroachment on forest lands leading to land-use changes	<ul style="list-style-type: none"> • Recognizes the need for the trend to be reversed
Forest Fires	<ul style="list-style-type: none"> • Stricter forest fire protection • RS and GIS-based research to map forest fire-prone areas across the country
Grazing	<ul style="list-style-type: none"> • Grazing to be regulated • Rights and concessions should be as per the carrying capacity of the forests
Mining in Forest Fringe Areas	<ul style="list-style-type: none"> • Appropriate mining plans to minimize the impacts of mining on the environment • Restoration of mining areas as per scientific know-how to rehabilitate the degraded lands
Diversion of Forest Land for Non-Forest Purposes	<ul style="list-style-type: none"> • Diversion of forest land should be subject to most careful examinations • Appropriate plans for addressing conservation and land degradation issues
Climate change	<ul style="list-style-type: none"> • Forest conservation and focus on increase of tree cover.
Promoting land restoration	How to promote?
Reclamation of wasteland and degraded forestland	<ul style="list-style-type: none"> • The policy essentially serves the purpose



Observations:

- The policy looks at forests in isolation of the needs and dependencies of the people living in the vicinity, and linkages with other sectors were not considered to address the anthropogenic pressures on the forests.
- Prioritizing forest land diversion, especially in cases such as mining in quality natural forest areas and setting principles for valuations of land as well the ecosystems services of forest has been proven to be a gap in the last two decades.
- While the need for raw material for wood-based industries has been recognized, the industry was expected to be self-sufficient by their own means in terms of raw material. Affirmative actions to promote such activities by involving people and industries are lacking.
- The pathway for achieving the target of 33% (66% in hills) of the land under tree cover as enunciated in the policy is not detailed.
- The policy does not facilitate private investment for the rehabilitation of degraded land.
- The policy speaks about the trees outside the forests and discourages converting good agricultural land to forests, but people's active support towards promoting tree plantation is lacking.
- The policy does not speak much about conserving forest biodiversity or biodiversity outside the demarcated forest areas or protected areas. More specifically, treatment and management of 'forests outside notified forests' have been missing from the policy, which has put the sustainability of these areas under threat due to inadequate protection from other legal instruments.
- Climate change was not a mainstream subject when the policy was adopted. This aspect is visibly absent from the policy.

3.2.2

The National Conservation Strategy and the Policy Statement on Environment and Development, 1992

The National Conservation Strategy and the Policy Statement on Environment and Development (NCSPSED), 1992 was adopted in response to the need to lay down the guidelines to help weave environmental considerations into the development process and reorient policies and actions in unison with the environmental perspective. The adoption of the Policy Statement is co-terminus with the adoption of the three significant Rio Conventions, namely the United Nations Framework Convention on Climate Change, the Convention on Biological Diversity, the United Nations Convention to Combat Desertification.

The strategies under the NCSPSED are not limited to conservation of land but deal with all the aspects of environment conservation in detail while also acknowledging the need for sector-specific challenges and strategies related to water and land. The key drivers of environmental degradation recognized under the NCSPSED encapsulate drivers for land degradation such as population growth,

overgrazing, conflicting uses of forest land (conservation vs mining), competing uses of agricultural land, unchecked and unplanned urban development, and encroachment of wetlands and destruction of coastal features. The priority agenda for action concerning the land and water policy under the NCSPS strongly argues for adopting an integrated land and water management approach towards sustainable food production, animal husbandry, and other activities. The NCSPS also provides that land and water use are to be considered together, particularly in recurring droughts and floods.

Being an environment policy statement formulated in the context of India's active participation in the global environmental conventions in 1992, the Policy Statement provides specific generic directions on subjects that are entirely managed by the states but fail to offer any concrete linkages with the state-level institutional mechanism to take the policy forward.



Observations:

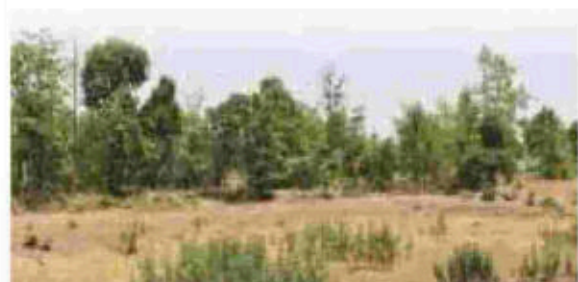
- The NCSPS, 1992, takes a 360 degree view on the protection of environment and natural resources, essentially targeting four thematic areas – population, land-water nexus, biodiversity and biomass as key elements of conservation strategy and has a substantial focus on the conservation and protection of land resources.
- The acknowledgement of the incorrect siting of industries as a major driver for land and water quality deterioration in the National Policy statement is significant from the industrial zoning perspective and calls for the realignment of clearance procedures with the siting criteria.
- To prevent productive agricultural land from the environmental impacts of large industries, the NCSPS provides for the establishment of smaller industries, MSMEs in rural areas, recommended as a strategy. This Policy Direction is yet to be followed at the implementation level.
- The NCSPS also provides a direction for the integration of cost benefit analysis but does not elaborate in terms of valuation of ecosystem services such as in the EIA process.
- The other key strategies for sustainable land governance advanced by the NSCPS are to create stakes/incentives for local people to conserve local biomass resources for a later use and adopt a set of specific strategies for agriculture and irrigation such as development of pesticide and insecticide policies from the land perspectives.
- The strategy also provides for phasing out and stoppage of persistent and toxic pesticides, promotion of bio-fertilizers and bio-pesticides and anticipatory programmes to check negative impacts of land and soil health.
- The drivers of environmental degradation with wide ramifications are subsumed into the drivers of land degradation recognized as population growth, overgrazing, conflicting uses of forest land (conservation vs mining), competing uses of agricultural land, unchecked and unplanned urban growth, encroachment of wetland and coastal features.

Key Features Relevant to SLEM:

The NCSPS, 1992, stresses the need to adopt specific steps at the appropriate level for the sustainable use of land and water relevant to SLEM. The steps are as follows:

- Land use zoning
- Legislation for ensuring land and soil quality
- Mandatory provisions of buffer areas (land protection areas) around water bodies
- Participatory social forestry with micro-level planning
- Countrywide campaign to minimize soil and run-off losses by carrying out extensive works like contour trenching, contour bounding, terracing, construction of small storages, catchment treatment, and protection of the vegetal cover in the catchments and watersheds
- Measures for preventing wind erosion by undertaking special programmes of conservation and afforestation in desert areas

- Development of suitable agro-silvipastoral techniques with an emphasis on hilly areas and semi-arid zones
- Building up a network for assessing and monitoring soil and water (surface and groundwater) quality throughout the country should be done on a permanent basis, as in the case of meteorological stations
- Conservation of wetlands for ensuring sustainable ecological and economic benefits
- Encouragement to and improvement in traditional methods of rainwater harvesting and storage





3.2.3 The Policy Statement for Abatement of Pollution, 1992

The Policy Statement for Abatement of Pollution (PSAP), 1992 was adopted under the enactment of the three pollution control laws, namely the Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act, 1981, and the Environment (Protection) Act, 1986.

Key Features Relevant to SLEM:

The PSAP has the following features relevant for SLEM:

- **The shift from theory to practice:** The policy statement recognizes that a policy shift is needed from merely identifying the problems to actual implementation, a pertinent recognition from the viewpoint of integrated management of land resources.
- **Emphasis on pollution prevention:** PSAP emphasizes pollution prevention in place of the conventional end-of-the-pipe treatment. It also identified adopting the best available and practicable technologies as the key element for pollution prevention.
- **A mix of regulatory measures:** It is stated that a combination of instruments in the form of legislation and regulation, fiscal incentives, voluntary agreements, educational programmes, and information campaigns need to be made to prevent the depletion of natural resources from pollution. It is also relevant for mainstreaming SLEM across sectors and land uses.

- **Common principles:** Another critical aspect of PSAP is that it complements the Forest Policy Statement, 1992, agreed at Rio and argues for ensuring that all the sector-specific policies need to be based on a set of principles that harmonize economic development and environmental imperatives. The policy adopts the guiding principles of prevention of pollution at source, adoption of best available technology, the polluter pays principle and public participation in decision making.
- **The strategy of critically polluted areas:** PSAP also includes pollution abatement measures, clustering of industries, use of technology for wastewater treatment, laying down environmental standards, and provision of environmental audit.
- **Specific directions on land:** Specific policy directions under the PSAP concerning improving land and green cover include on-land disposal using suitable vegetation cover, concerted efforts for the planting of trees alongside roads, rail lines, canals and on other unutilised lands under State/ corporate, institutional or private ownership. The development of green belts in urban and industrial areas and along the railway tracts is to be taken up to check erosion, desertification and improve the micro-climate.

The impacts of the policy on drivers of degradation are summarized below:

Drivers of land degradation	Supporting provisions
Wastewater produced from urban communities and industries	<ul style="list-style-type: none"> • Adopting biological wastewater treatment, suitable vegetative cover, and resource recovery technologies.
Solid wastes	<ul style="list-style-type: none"> • Promoting development and adoption of cleaner technologies, including environment friendly biotechnology
Pollution from the run-off of agricultural inputs such as pesticides, insecticides and fertilisers	<ul style="list-style-type: none"> • Introducing environmentally acceptable pesticides, particularly biopesticides. Increasing integrated pest management practices.
Promoting land restoration	How to promote?
Plantation and vegetation	<ul style="list-style-type: none"> • By carrying out plantations and increasing the vegetal cover in hill slopes, catchment areas of rivers, lakes and reservoirs, ocean shores, semi-arid and arid tracts, in and around urban centres, and industrial establishments.



Observations:

- A set of common principles in all sector-specific policies could become the first step towards mainstreaming SLEM as provided by the PSAP.
- The PSAP emphasizes on addressing the problems in critically polluted areas and points towards a prioritization strategy, which is yet to be formalized at the policy level.
- Water and land pollution are perceived in isolation and delinked but the PSAP clearly acknowledges them. Thus, the cause and effect of linkages of water pollution and land degradation are clearly recognized under the PSAP.
- The Policy prescription of locating Small Scale Enterprises (SMEs) in rural areas and not the polluting industry has the potential to prevent further degradation of prime agricultural and common land in the rural areas.
- The Policy envisages that the SMEs for environmental transition should be provided with planning and technological assistance so that their environmental footprint on water and land resources is contained. The progress on this aspect needs to be examined as SMEs in the urban and rural areas remain largely unregulated on environmental aspects.

3.2.4 National Environment Policy, 2006

The National Environment Policy (NEP), 2006 seeks to extend the coverage and fill in gaps in the National Conservation Strategy and Policy Statement on Environment and Development of 1992, Policy Statement on Abatement of Pollution of 1992, and National Water Policy, 2002. It does not displace but builds on the earlier policies.

The NEP 2006 also responds to India's commitment to a clean environment, mandated in the Constitution in Articles 48 A and 51 A (g), strengthened by judicial interpretation of Article 21. It is recognized that maintaining a healthy environment is not the state's responsibility alone but also that of every citizen. A spirit of partnership should thus be realized throughout the spectrum of environmental management in the country. While states must galvanize their efforts, each individual, natural or institutional, should recognize its responsibility towards maintaining and enhancing the quality of the environment.

The NEP has enunciated 14 principles that have an established genealogy in policy pronouncements, jurisprudence and international environmental law:

- Human beings are at the centre of sustainable development concerns
- The right to development

- Environment protection is an integral part of development
- The precautionary approach
- Economic efficiency
- Entities with incomparable values
- Equity
- Legal liability
- Public trust doctrine
- Decentralization
- Integration
- Environmental standards setting
- Preventive action
- Environmental offsetting

Key Features Relevant to SLEM:

- **Recognition of natural ecosystems:** NEP recognizes enhancing conservation of natural resources, namely desert ecosystems, forests, biodiversity, freshwater resources (rivers, groundwater and wetlands), mountain ecosystem, and coastal resources.
- **Polluter pays principle:** As a result of the polluter pays principle, the cost of preventing pollution or minimising environmental damage due to pollution will be borne by



those responsible for pollution. Furthermore, if there are threats of severe irreversible environmental damage, the lack of complete scientific certainty will not be used as a reason for postponing measures to prevent environmental degradation.

- **Critical ecosystems:** The NEP emphasizes protecting and conserving critical ecological systems and resources, ensuring equitable access to environmental resources, and judicious efficient use of environmental resources.
- **Economic benefits from conservation:** It emphasizes conservation of resources and points out that the best way to aid conservation is to ensure that people dependent on resources obtain better livelihoods from conservation than from degradation of the resources. The policy also seeks to stimulate partnerships of different stakeholders, including public agencies, local communities, academic and scientific institutions, investment communities, and international development partners, in harnessing their respective resources and strengths for environmental management.
- **Recognition of unintended effects on land degradation:** It points out that sectoral policies may have unintended consequences on land degradation and suggests review and harmonization of the existing body of law. It also recognizes that the relevant fiscal, tariffs and sectoral policies need to take explicit account of their unintentional impacts on land degradation.
- **Mitigation measures:** Environmental Impact Assessment would continue to be the principal methodology for appraisal and review of new projects as part of environmental offsetting, which is central to the mitigation measures. Environmental protection shall constitute an integral part of the development process to achieve sustainable development and cannot be considered in isolation. It also suggests better monitoring of compliances, use of economic principles in environmental decision making, new coastal zone regulations to make coastal environmental regulations more holistic and, thereby, ensure protection to coastal ecological systems, waters and the vulnerability of some coastal areas to extreme natural events and potential sea-level rise.
- **Extension of protected area network:** It also seeks to expand the control of wildlife conservatories in other areas where endangered species exist based on the conservation of ecosystem approach. It also underlines the importance of the participation of people as part of wildlife conservation.
- **Involvement of panchayati raj institutions and urban local bodies:** It also proposes enabling Panchayati Raj Institutions and urban local bodies to monitor compliance with environmental management plans.
- **Encourage science-based approach:** Encourages adoption of science-based and traditional sustainable land-use practices through research and development, the extension of knowledge, pilot-scale demonstrations, and large-scale dissemination, including farmer's training, and where necessary, access to institutional finance, promotion of agroforestry, organic farming, environmentally sustainable cropping patterns and adoption of efficient irrigation techniques.
- **Arresting degradation:** It calls for promoting reclamation of wasteland and degraded forestland through formulation and adoption of multi-stakeholder partnerships involving the land-owning agency, local communities, and investors. It also calls for preparing and implementing thematic action plans and incorporating watershed management strategies for arresting and reversing desertification, expanding green cover and promoting sustainable alternatives to shifting cultivation where it is no longer ecologically viable. It will ensure culture and social organization of the local people are not disrupted and encourage agroforestry, organic farming, environmentally sustainable cropping patterns, and the adoption of efficient irrigation techniques.





The impacts of the policy on the drivers of land degradation are summarized below:

Drivers of land degradation	Supporting provisions
Climate change induced land degradation in mountain ecosystems and coastal ecosystems	<ul style="list-style-type: none"> • Early Warning Systems for extreme events such as rainfalls and floods • Design of conservation measures taking into account climate change-induced impacts, e.g., check dam construction and maximum rainfall interval changed from 25 years to 200 years
Excessive use of water for irrigation	<ul style="list-style-type: none"> • Educate farmers on judicious use of water for irrigation and adoption of efficient irrigation techniques
Indiscriminate use of agricultural chemicals	<ul style="list-style-type: none"> • Educate farmers on judicious use of fertilizers for agriculture
Reduction in organic matter content in the soil	<ul style="list-style-type: none"> • Encourage agroforestry, organic farming and environmentally sustainable cropping patterns
Industry, mining and transport-related pollution	<ul style="list-style-type: none"> • Proper Due Diligence - EIA and SIA for projects and appropriate rehabilitation/mitigation plans • Set up environmental management infrastructure, as well as monitoring & enforcing environmental compliance • Project monitoring and implementation of environmental management plans through participatory processes
Hazardous wastes and waste treatment	<ul style="list-style-type: none"> • Develop a national inventory, an online monitoring system for the movement of hazardous wastes. • Strengthen capacities of institutions and legal arrangements. • Develop and implement strategies for recycling, reusing through the promotion of relevant technologies and using incentive-based instruments
Soil erosion	<ul style="list-style-type: none"> • Adopt appropriate land use planning and watershed management practices
Promoting land restoration	How to promote?
Reclamation of wasteland and degraded forestland	<ul style="list-style-type: none"> • Formulation and adoption of multi-stakeholder partnerships involving the land-owning agency, local communities and investors
Arresting and reversing desertification	<ul style="list-style-type: none"> • Preparation and implementation of thematic action plans incorporating watershed management strategies for arresting and reversing desertification and expanding green cover

Observations:

- The environment has been viewed as a resource of use, albeit with considerations for environmental concerns.
- The policy aims at regulations to control environmental degradation due to organized economic activity but does not adequately address unsustainable land-use practices, leading to the degradation of forests, agriculture or wastelands.
- While the EIA remains the primary tool to assess clearances, quality issues mostly due to capacities, standards and models to estimate economic costs of environmental degradation exist.
- Monitoring of compliances for environment and forest/ wildlife clearances is also a gap.
- The policy would have provided for appropriate valuation of ecological services. However, that has not been addressed.
- Incentives to minimize wasteful use of natural resources are still a work in progress.



- Institutions to enforce legal liabilities for causing environmental harm are still weak.
- There is good theoretical coverage on land and water use practices, but the policy doesn't delve deeper into critical processes and drivers that aid the degradation of these resources.
- The policy ignores the elimination of unsustainable production and consumption practices of non-renewable resources by the profit-making sectors and affluent classes and fails to take care of market failures.
- There is an absence of any framework to evaluate the effectiveness of land degradation and restoration responses, including prevention, mitigation and rehabilitation.
- The policy remains silent on the types of institutional forms and rights that need to be created to facilitate access and ownership of natural resources to dependent people in a sustainable way.
- The policy does not suggest any proactive measure to prevent the dumping of solid waste materials, effluents, and other toxins in rivers and maintain environmental flows in rivers.
- The policy presents neither targets nor provides any definite plan of action for fringe area development which is necessary both for the conservation of ecologically sensitive areas and for the livelihood security of agricultural labourers and small farmers.

3.2.5 National Agriculture Policy, 2000

The National Agricultural Policy was adopted in 2000 to accelerate the agricultural growth rate by 4% by 2020. It included adopting a slew of measures like strengthening rural infrastructure, promoting value addition by speedy growth of agri-business, increasing employment opportunities in rural areas to improve the standard of living and discouraging migration of rural population and adapting to the challenges of economic liberalization by fulfilling the needs of the domestic and foreign markets. Among the wide range of objectives, the NAP seeks to include private sector participation and contract farming, provide insurance to farmers, rational water utilization and optimization of irrigation, protection of plant varieties through legislation, adequate and timely supply of quantity inputs to farms, rural electrification and setting up of agro-processing units for creating off-farm employment in rural areas. Collectively, these objectives touch upon SLEM, and the fulfilment of these objectives is likely to foster sustainability in the farming sector.

Key Features Relevant to SLEM:

- **Promotion of sustainable agriculture:** The Policy promotes environmentally non-degrading farming practices and the use of the country's natural

resources-land, water and genetic endowment to promote sustainable development of agriculture. Resilience in farming systems is also promoted through drought-resistant, high-yielding varieties and the use of biotechnology. The other measures for sustainable agriculture under the policy include conjunctive use of bio-mass, organic and inorganic fertilizers, and controlled use of agrochemicals through integrated nutrients and pest management (INM and IPM) to achieve sustainable increases in agricultural production. However, there is no mention of flood resilience in agriculture.

- **Integrating agroforestry and livestock management:** The Policy envisages undertaking special efforts to raise the productivity and production of food crops. Agroforestry is proposed to promote agro-based industries, diversification of agriculture, and off-farm employment. It will also help in developing animal husbandry, poultry, dairying, and aqua-culture.
- **Institutional restructuring for inputs management:** The policy emphasizes balanced and optimum use of fertilizers together with the help of organic manures and bio-fertilizers to optimize nutrient use efficiency



for achieving sustainable environmental outcomes. The seed inputs management is to be improved through institutional reforms for which a National Seed Grid is to be established to ensure the supply of seeds, especially to areas affected by natural calamities. The policy provides for restructuring the National Seeds Corporation (NSC) and State Farms Corporation of India (SFCI) for efficient utilization of investment and manpower.

- **Incentives and Investments not geared towards sustainability outcomes:** The Policy envisages removing distortions in the incentive regime by improving trade terms with manufacturing sectors, market reforms, and tax structure. Investment measures include bringing private sector participation, reliable and subsidized electricity and optimization of irrigation potential. However, subsidized electricity is often held responsible for overexploitation of groundwater. The investment and incentive measures under the policy are thus not aligned with sustainable outcomes.

Post-2000, there have been certain developments that are positive for SLEM. They are as follows:

- Neem-coated urea was permitted for commercial manufacturing from 2004 onwards.

- The National Food Security Mission was launched in 2007-08 across 311 districts of 17 states.
- The National Mission on Sustainable Agriculture was formulated as part of the National Action Plan on Climate Change in 2010 and became functional as a programme in 2014-15.
- National Agroforestry Policy was released in 2014 for promoting agroforestry. However, farmers face challenges while taking up agroforestry due to the absence of markets in certain areas and state regulations, which hinder the harvesting/transit/sale of certain agroforestry species, credit availability.
- A sub-mission on agroforestry was initiated.
- Climate-smart technologies to aid farmers to adapt to climate change has been in focus in recent times. Research and extension efforts have been directed towards it.
- Recent efforts are also focusing on improving farmers' incomes through market mechanisms and not merely on production.
- Efforts in expanding micro-irrigation have borne results with about 12.4 Mha covered with drip and sprinkler systems.

The impacts of policy prescriptions on drivers of degradation are summarized below:

Drivers of land degradation	Supporting provisions
Cultivation of crops without adhering to scientific know-how leading to deterioration in soil health	<ul style="list-style-type: none"> • Diversified cropping patterns • Proper crop rotation for fixing nitrogen in the soil
Subsidised input supply leading to indiscriminate use of fertilizers and pesticides, which in turn leads to poor soil health	<ul style="list-style-type: none"> • Greater awareness about judicious use of fertilisers based on soil testing • Soil testing and distribution of soil health cards
Indiscriminate use of groundwater due to subsidized electricity	<ul style="list-style-type: none"> • Greater awareness on judicious use of water • Appropriate pricing of water pumped from ground for irrigation purposes • Promotion of water-efficient devices like drips and sprinklers
Promotion of livestock and small ruminants	<ul style="list-style-type: none"> • Practice stall feeding for livestock • For small ruminants, rotational grazing promoted in common grazing areas



Promoting land restoration	How to promote?
Restoration of wasteland	<ul style="list-style-type: none"> • Increase impetus to agroforestry to help restore wastelands and prevent further degradation of land • Promote sustainable agricultural practices and prevent deterioration/ degradation of land under cultivation • Penetration of micro-irrigation
Economic use of wasteland	<ul style="list-style-type: none"> • Redistribution of surplus and wasteland among landless and unemployed youth • Agroforestry providing supplementary income for farmers
Economic use of marginal land	<ul style="list-style-type: none"> • Agroforestry providing supplementary income for farmer

Observations:

- The policy measures are geared towards enhancing agricultural productivity and agricultural reforms.
- The provisions with respect to promoting conjunctive water use and water sensitive agricultural practices and the provisions on low cost electricity to farmers without a regulatory mechanism are conflicting.
- The provisions on consolidation of land, tenancy reforms, redistribution of surplus and wasteland among landless and unemployed youth and improvement of land records are progressive but will require building a threshold capacity at the revenue district level for which a roadmap and action plan in the policy is absent.

3.2.6 National Policy for Farmers, 2007

The National Policy for Farmers (NPF), 2007, was formulated to focus on farmers and improve their income by bringing qualitative improvements in land resources.

Key Features Relevant to SLEM:

The NPF has the following features that are relevant to SLEM:

- **Dedicated focus on prime farmland:** The NPF protects and improves the land, water, biodiversity and genetic resources by creating an economic stake in conservation. The NPF envisages that the prime farmland must be conserved for agriculture except under exceptional circumstances. The agencies provided with agricultural land for non-agricultural projects should compensate for treatment and full development of equivalent degraded/ wastelands elsewhere.
- **Earmarking of lands on biological potential:** State governments are advised to earmark lands with low biological potential, such as uncultivable land and land affected by salinity and acidity for non-agricultural

development activities, including industrial and construction activities.

- **Integrated land water management:** The NPF has a considerable focus on land-water integration and provides several water-related measures such as conservation, harvesting, conjunctive use, less water-intensive crops and a different strategy for drought-prone areas.
- **Codes as a mitigating strategy:** The specific measures for the drought-prone areas include introducing a Drought Code to identify the action needed to minimize the impact of adverse monsoons and maximize the benefits of a good season. Similarly, in areas prone to heavy rainfall, a Flood Code would be introduced to mitigate distress to take care of the farmer's needs.
- **Conservation and green agriculture:** The NPF also talk about "Conservation Agriculture" and Green Agriculture. "Green agriculture" involves integrated





pest management, integrated nutrient supply and integrated natural resources management as the pathway to an "Evergreen Revolution". Unlike organic farming, green agriculture permits safe and minimal use of mineral fertilizers and chemical pesticides and crop varieties developed by genetic modification.

- **Identification of funding to support policy measures:** For financial support of the Policy initiatives under the NPF, various funds for a different set of activities have been identified, such as the Price Stabilisation Fund for plantation crops, National Gene and Biodiversity Fund. The funding schemes of MoPR, MoAFW, MoRD are also recognized for funding initiatives.

- **Contingency plans:** The NPF also envisages contingency plans and alternative land-use and water-use strategies for each major agro-climatic zone.
- **Inclusivity and stewardship through climate managers:** The NPF provide that in drought and flood-prone areas, experienced farmers would be trained as "Climate Managers" in the art of managing drought, floods and aberrant monsoons.
- **Gender:** The NPF provides support services to women. Another important aspect under the NPF is conservation farming that needs to be prioritized in the Green Revolution's heartland and turning the Indo-Gangetic Plains into a major food basket through an appropriate mix of technology services and public policies.

The impacts of the policy on the drivers of land degradation are summarized below.

Drivers of land degradation	Supporting provisions
Intensive utilization of land not commensurate with potential	<ul style="list-style-type: none"> • Reclamation of low biological potential land through scientific treatments and promotion of "Green Agriculture"
Promotion of livestock, including small ruminants	<ul style="list-style-type: none"> • Practice stall feeding for livestock. • Rotational grazing is to be promoted in common grazing areas for small ruminants
Promoting land restoration	How to promote?
Land management practices	<ul style="list-style-type: none"> • Practice agriculture as per land use capability • Promotion of soil conservation measures • Soil health and soil testing • Nutrient management
Management of water resources	<ul style="list-style-type: none"> • Improvement of water use efficiency by using irrigation equipment in synergy with seed varieties • Nutrient management (macro and micro) and use of farm implements • Water conservation measures, water harvesting measures, conjunctive use of water • Cultivation of less water-intensive crops
Economic use of marginal land	<ul style="list-style-type: none"> • Promotion of agroforestry on marginal and degraded land

Observations:

- The geographical focus of the Policy to implement conservation farming in the Indo-Gangetic Plains as a measure to achieve food security is not substantiated and gives an impression of debatable prioritization.
- Categorization of lands as prime land and low biological value land for implementing policy measures does add to the existing categorization of lands under the revenue records. The policy does not guide on the procedure for such categorization at the implementation level. Such a land categorization has also not been initiated after the policy came into existence.



- The provision of 'Climate Managers' is a progressive element. However, there is no further guidance on the capacities, roles and responsibilities of climate managers.
- Integration of Conservation and Green Agriculture as concepts with actual programmes under implementation such as watershed programmes or agro-forestry activities is desirable.
- The focus on gender is minimal and merely providing support services is envisaged. Whether women climate managers could be trained differently is not captured under the policy.
- Treatment and support to women farmers as a priority group is essential. The policy does not adequately address this theme.

3.2.7 The National Water Policy, 2012

The first National Water Policy (NWP) was adopted in September 1987, which was later revised and updated in 2002. The National Water Policy of 2012, which replaced the earlier policy, provides the broad direction in which water resource development and water sector reforms are expected to take place. It lists the major concerns that need to be addressed and enunciates the principles to be adopted to overcome these challenges.

Some of the basic principles that govern the NWP 2012 are as follows:

- Water may be treated as an economic good to promote conservation and efficient use after basic needs such as drinking water and sanitation are met.
- A common integrated perspective should govern the planning and management of water resources. Such a perspective would take into account local, regional and national contexts and focus on an environmentally sound basis. The river basin is considered the basic hydrological unit under this policy.
- For the first time, the concept of the Public Trust Doctrine has been introduced in the National Water Policy document as a part of water sector reform.
- The policy underlines that the principle of equity and social justice must inform the use and allocation of water.
- The policy notes that given the limits on enhancing the availability of utilizable water resources and increased variability in supplies due to climate change, meeting the future needs will depend on more on-demand management. Hence, this needs to be given priority,

especially through (a) evolving an agricultural system that economizes on water use and maximizes value from water, and (b) bringing maximum efficiency in using water and avoiding wastages.

- Water quality and quantity are interlinked and need to be managed in an integrated manner, consistent with broader environmental management approaches inter-alia, including economic incentives and penalties to reduce pollution and wastage.
- The impact of climate change on water resources availability must be factored into water management-related decisions. Water using activities need to be regulated, keeping in mind the local geo-climatic and hydrological situation.

Key Features Relevant to SLEM:

- **National Water Framework Law:** The policy proposed a National Water Framework (NWF) law as an umbrella statement of general principles governing the exercise of legislative and/or executive (or devolved) powers by the Centre, the States and the local governing bodies. The NWF must recognize water as a scarce resource and a sustained way of life and ecology.
- Water particularly groundwater, needs to be managed as a community resource held, by the State, under public trust doctrine to achieve food security, livelihood, and equitable and sustainable development for all. Existing Acts may have to be modified accordingly.
- There is a need for comprehensive legislation for optimum development of inter-state rivers and river



valleys to facilitate inter-state coordination, ensuring scientific planning of land and water resources by taking basin/sub-basin as a unit with unified perspectives of water in all its forms (including precipitation, soil moisture, ground and surface water) and also holistic and balanced development of both the catchment and the command areas.

- **Adaption to climate change:** The policy takes cognizance of the international discourse on climate change which primarily focuses on emission reduction as the principal vehicle for adaptation. It advocates using technology to reduce the carbon footprint, demand management through changes in consumption patterns, and lifestyle modifications through financial incentives and disincentives.
- **Water pricing:** The NWP 2012 suggests that water pricing should ensure its efficient use and reward water conservation efforts. To address the water-pricing problem, the Centre strongly advocated the establishment of state water regulatory authorities.
- **Integrated watershed development:** The policy focuses on integrated watershed development activities with groundwater perspectives considered to increase soil moisture, reduce sediment yield, and increase overall land and water productivity.
- **Uses of water:** After meeting pre-emptive needs for safe drinking water and sanitation, achieving food security, supporting poor people dependent on agriculture for their livelihood and high priority allocation for minimum ecosystem needs, water should be treated as an economic good for promoting its conservation and efficient use.
- **Management of flood and drought:** The policy states that while every effort should be made to avert water-related disasters such as floods and droughts through structural and non-structural measures, emphasis should be given to preparedness for flood/drought with coping mechanisms as options. Greater emphasis should be placed on the rehabilitation of the natural drainage system.
- **River ecology:** The ecological needs of the river should be determined to recognize that river flows are

characterized by low or no flows, small floods (freshets), large floods and flow variability and should accommodate development needs. A portion of river flows should be kept aside to meet ecological needs ensuring that the proportional low and high flow releases correspond closely to the natural flow regime.

- **Involvement of local governing bodies:** Panchayats, Municipalities, Corporations and Water Users Associations, wherever applicable, should be involved in the planning of the water-related projects. Water Users Associations should be given statutory powers to collect and retain a portion of water charges, manage the volumetric quantum of water allotted to them and maintain the distribution system in their jurisdiction.

While increased water usage continues to impact both ground and surface water sources, many initiatives have been taken by the Centre and state governments after the NWP 2012 to take the policy indicatives forward⁴³.

- The government published a National Water Framework Bill in 2013.
- The Standing Committee on water resources examined the subject 'Review of groundwater scenario, need for a comprehensive policy and measures to address the problems in the country with particular reference to (i) dark blocks, and (ii) contamination of underground water by certain industries' and submitted their report in December 2015.
- Ten states and five union territories (UTs), namely, Andhra Pradesh, Assam, Bihar, Goa, Himachal Pradesh, Karnataka, Kerala, West Bengal, Telangana, Maharashtra, Lakshadweep, Jammu & Kashmir, Puducherry, Chandigarh and Dadra & Nagar Haveli, have adopted and implemented groundwater legislation.
- The Centre reorganised existing ministries to create the Ministry of Jal Shakti to address the looming water crisis.
- In line with the evolving concepts of springshed management and the growing importance of hydrogeology, the Ministry of Jal Shakti formulated the Hydro-Metrological Data Dissemination Policy in 2018.

⁴³ Section adapted from Roopal Suhag, February 2016, Overview of Ground Water in India, PRS Legislative.



The impacts of the policy on the drivers of land degradation are summarized below:

Drivers of land degradation	Supporting provisions
Unsustainable drawl of groundwater	<ul style="list-style-type: none"> • Demand side management through compatible agricultural strategies and cropping patterns and improved water application methods, such as land levelling and/or drip/sprinkler irrigation to enhance water use efficiency • Water use in over-exploited areas needs to be arrested by introducing policy regulations and improved technologies of water use, incentivizing efficient water use and encouraging community-based management of aquifers • Mapping the aquifers to know the quantum and quality of groundwater resources (replenishable as well as non-replenishable)
Promotion of livestock, including small ruminants	<ul style="list-style-type: none"> • Practice stall feeding for livestock. • Rotational grazing is to be promoted in common grazing areas for small ruminants
Floods increased erosion and increased the frequency of droughts	<ul style="list-style-type: none"> • The impacts of climate change on water resources availability must be factored into water management-related decisions. Water using activities need to be regulated, keeping in mind the local geo-climatic and hydrological situation
Salinity intrusion in ground water aquifers/ surface water and increased coastal inundation in coastal regions	<ul style="list-style-type: none"> • Stakeholder participation in land-soil-water management with scientific inputs
Natural water bodies and drainage channels are being encroached upon and diverted for other purposes. Groundwater recharge zones are often blocked.	<ul style="list-style-type: none"> • Maintenance of environmental flows determined through scientific assessments
Growing pollution of water sources, primarily through industrial effluents	<ul style="list-style-type: none"> • Water quality and quantity are interlinked and need to be managed in an integrated manner, consistent with broader environmental management approaches, including the use of economic incentives and penalties to reduce pollution and wastage
Promoting land restoration	How to promote?
Conservation of wetlands for ensuring sustainable ecological and economic benefits	<ul style="list-style-type: none"> • Management Plans for identified wetlands and mangrove areas • Policy for protection of wetlands and water bodies in urban or peri-urban areas
Encouragement to and improvement in traditional methods of rainwater harvesting	<ul style="list-style-type: none"> • Revival of traditional water management systems and development of alternate irrigation systems such as harvesting and conserving run-off rainwater

Observations:

- Groundwater is still perceived as an individual property and is exploited inequitably without any consideration to its sustainability, leading to over-exploitation in several areas.
- The policy has suggested water pricing, which is one of the critical areas of reforms in the water sector
- Recognition of river corridors, maintenance of ecological flows, watershed management and are others enabling policy intentions that are critical for SLEM, which have to be supported in practice.
- The NWP 2012 talks about using economic incentives and penalties to reduce pollution and wastage. There is need for an agency that sets standards on water use efficiency.





3.2.8 National Agroforestry Policy, 2014

Trees growing outside demarcated forest areas contribute substantially to people's wood, fodder, and fuel needs. A dedicated policy on agroforestry announced in 2014 intends to further this objective by resolving the bottlenecks that have emerged at the interface of existing policies for agriculture, forestry, water and environment, as far as growing trees outside the forest area are concerned. Thus, the main aim of the policy is food and wood security with a focus on improving the farmer's income. The other important motive of the policy is to treat the degraded land available through afforestation.

Key Features Relevant to SLEM:

As the policy aims to encourage tree growing to fulfil sustenance, economic and environmental needs, the policy is supportive of SLEM. The policy notes the key challenges and interventions required to enhance afforestation and tree farming in non-forest areas.

Some key points covered in the policy are:

- Removing the restrictive regulatory regime for growing, harvesting and transportation of forestry species
- Addressing the issue of wood-based industries operating at sub-optimal levels and reliance on imported wood
- Existing gaps in the area of farmer's access to quality planting material, extension activities and know-how

- Resolving inadequate linkage of tree growers with industry
- Promoting tree farming as part of integrated farming systems
- Creating marketing infrastructure, enabling Farmer Producer Organisations (FPOs) to take up tree farming, covering agroforestry produce under Warehouse Development and Regulation Act
- Enhancing the role of decentralized institutions such as JFMCs and Eco-Development Committees
- Suggesting the selection of 20 tree species for agroforestry for each State based on the adaptability and suitability of the trees
- Underlying the need for convergence with schemes such as MNREGA, National Bamboo Mission, NRLM and RKVY
- Creating a mission/ board for dedicated implementation of agroforestry in the country

A sub-mission on agroforestry was initiated after the policy was adopted.

The impacts of the policy on the drivers of land degradation are summarized below:

Drivers of land degradation	Supporting provisions
Grazing	<ul style="list-style-type: none"> • Directly impacts the availability of wood, fuelwood and fodder from non-forests areas, which would reduce pressure on forest land, increase restoration or productive use of wastelands • Indirectly as enhanced income from agriculture would reduce the tendency of encroachment
Firewood/ wood removal	
Encroachment/ land diversion	
Promoting land restoration	How to promote?
Restoration of wasteland	<ul style="list-style-type: none"> • Encourages wastelands to be taken up for agroforestry plantations. However, the tendency for monoculture and exotics may reduce the ecosystem benefits • With adequate institutional finance, market access and support from research and development, good economic returns can be gained from agroforestry plantations in the wasteland and marginal land
Economic use of wasteland	
Economic use of marginal land	
Restoration of forests/ degraded forests	



Observations:

- The policy would play an important role not only in increasing the output of wood from outside the forest areas, but also in increasing carbon sequestration from forests and tree cover, which is critical for meeting India's NDC forestry target under UNFCCC.
- Agroforestry plantations also have a huge potential to attract funding under the voluntary carbon trading scheme.
- The development of local volumetric tables would aid the process of estimation of production of wood. It would enable the promotion of wood-based industry, which is otherwise defined by various pronouncements of the Supreme Court of India and the National Green Tribunal.
- Organizing tree growers in clusters, aggregating produce and using the FPO route are possible ways of improving the outcomes. Tree farming can be dovetailed with micro irrigation schemes to improve survival and productivity.
- Setting targets for increasing tree covers at the district level would help in better monitoring of the National targets. Focus on certain districts having higher tree cover with a positive culture of tree farming and required ecosystem in place may be prioritized under the policy.
- In spite of the policy, issues regarding access to markets, price fluctuations, financial support and regulations remain a challenge.
- Taking various agroforestry models developed by the institutions under ICFRE and ICAR to the field requires higher attention.
- Developing market linkages and supply chain for high-quality seedlings and seeds for agroforestry.

3.2.9 Fertilizer Policy

Regarding the applicability to SLEM, the fertilizer policy space is covered by the Urea Policy (Pricing and Administration) of 2015, Phosphatic and Potassic Policy, and City Compost Policy.

The Urea Policy covers the following key features:

- Ensure the availability of fertilizers and adequate availability of soil nutrients in all parts of the country
- Maximize indigenous urea production to reduce import dependency and subsidy burden on the government
- Promote energy efficiency to reduce carbon-footprint to make urea production environment friendly
- Make a urea production plant to adopt the best technology available and become globally competitive
- Urea producers to produce at least 75% neem coated urea

The government introduced Nutrient Based Subsidy Policy in 2010 in continuation of the erstwhile Concession

Scheme for decontrolled Phosphatic and Potassic (P&K) fertilizers with the following objectives:

- Ensuring that a sufficient quantity of P&K is at the farmer's disposal at statutory controlled prices so that agricultural growth is sustained and balanced nutrient application to the soil is ensured
- Ensuring a balanced use of fertilizers, improving agricultural productivity, promoting the development of the indigenous fertilizer industry, and reducing the burden of subsidy
- Fixing the subsidies on annual basis based on the quantity of the different macro/ micronutrients contained in the fertilizer

The Phosphatic and Potassic Nutrient-based Subsidy Policy is developed to promote balanced fertilization of the soil, which will lead to increased agricultural productivity and, consequently, better returns to the farmers.



The City Compost Policy encourages Urban Local Bodies to manage municipal solid waste scientifically, including processing waste-to-compost and other processes. City

compost plays a crucial role in replacing or supplementing chemical fertilizers in replenishing the nutrient-depleted soil.

The impacts of the policy on SLEM are as follows:

Drivers of land degradation	Supporting provisions
Subsidized fertilizers lead to an indiscriminate application that is the main reason for degradation of agricultural land and ground water pollution in lands contiguous to agricultural lands	<ul style="list-style-type: none"> Judicious use of fertilizer application in line with soil requirements Regular review of soil health Use of municipal waste replace chemical fertilizers
Increased agricultural productivity and better returns	<ul style="list-style-type: none"> Promote balanced fertilization of the soil, which will lead to increased agricultural productivity and yield better returns to the farmers

3.2.10 National Biofuel Policy, 2018

The National Biofuel Policy has been formulated to adopt biofuels as one of the five-pronged strategies to reduce the import dependency in the oil and gas sector. It stems out from the strategic role for biofuels envisaged in the Indian Energy basket.

The policy goal is to enable the availability of biofuels in the market, thereby increasing its blending percentage. The ethanol blending percentage in petrol is currently around 2.0%, and the biodiesel blending percentage in diesel is less than 0.1%. An indicative target of 20% blending of ethanol in petrol and 5% blending of biodiesel in diesel is proposed by 2030.

This goal is to be achieved by:

- Reinforcing ongoing ethanol/ biodiesel supplies through increasing domestic production
- Setting up second generation (2G) bio refineries
- Developing new feedstock for biofuels
- Developing new technologies for conversion to biofuels
- Creating a suitable environment for biofuels and their integration with the main fuels

Key Features Relevant to SLEM:

- It supports the development of new feedstock for biofuel, including agriculture and forestry residues.
- It focuses on appropriate financial and fiscal measures to support the development and promotion of biofuels periodically.
- Identifying locations with surplus available biomass and generation of feedstock such as energy grasses

and short gestation crops by utilizing wastelands will be pivotal for promoting Industrial set-up.

- Village Panchayat and communities play a crucial role in augmenting indigenous feedstock supplies for biofuel production. In cases of usage of wastelands for feedstock generation, local communities from Gram Panchayats/ Talukas will be encouraged for plantations of non-edible oil seeds bearing trees/ crops such as *Pongamia pinnata*, *Melia azedarach*, *Ricinus communis*, *Jatropha curcas*, *Calophyllum inophyllum*, *Simarouba glauca*, *Hibiscus cannabinus* etc.
- Short rotation crops such as sweet sorghum and energy grasses – *Miscanthus giganteus*, *switchgrass (Panicum virgatum)*, *giant reed (Arundo donax)* – will be planted in wastelands for generating additional feedstock for bioethanol production across the country.
- Farmers will be encouraged to grow a variety of different biomass and oilseeds on their marginal lands, as inter crop and as the second crop wherever only one crop is raised by them under rain fed conditions.
- Suitable supply chain mechanisms, feedstock collection centres and fair price mechanisms for the engaged community will be developed in coordination with Local Bodies, states and concerned stakeholders.
- The government will consider extending financial incentives, including viability gap funding, subsidies and grant for biofuels.
- Opportunities for generating carbon credits for the savings on CO₂ emissions on biofuel feedstock generation and use of biofuels, in pure or blended form, will be explored.



The impacts of the policy on the drivers of land degradation are summarized below:

Drivers of land degradation	Supporting provisions
Grazing	<ul style="list-style-type: none"> • Availability of grazing and firewood may become a co-benefit from biofuel plantations • Provides option for optimal utilization of harvests from forests by producing biofuel
Firewood/ wood removal	
Fire	<ul style="list-style-type: none"> • Incentivize community to protect or control incidences of fire, which would otherwise destroy biomass on the ground (however, mono-crop plantations will reduce the resilience of forests to climate-induced impacts)
MFP removal/ removal of bioresource	<ul style="list-style-type: none"> • Policies on sustainable harvesting at the local level
Promoting land restoration	How to promote?
Restoration of wasteland	<ul style="list-style-type: none"> • Encourages wastelands to be taken up for biomass plantations
Economic use of wasteland	<ul style="list-style-type: none"> • Biomass plantations can be an economic model with price support for communities
Economic use of marginal land	<ul style="list-style-type: none"> • Biomass plantations can be an economic model for seeking returns from marginal lands
Restoration of forests/ degraded forest	<ul style="list-style-type: none"> • Biofuel based species can be planted in degraded lands and can support community interests by sharing returns

Observations:

- The policy will play an important role in incentivizing farmers to use marginal farmlands. However, it will depend on the relative pricing of biodiesel and ethanol, fixed as per the pricing and fuel policy of the government.
- Waste and degraded lands can also be brought under this policy. However, it would require institutional mechanisms for facilitating the involvement of farmer cooperatives, panchayats, SHGs and user groups.
- The policy will have to be implemented in tandem with other policies such as the National Agroforestry Policy of 2014, National Agriculture Policy of 2000, and National Forest Policy of 1988.

3.2.11 National Mineral Policy, 2019

The National Mineral Policy was adopted in 2019 as a replacement for the earlier 2008 policy. The policy focuses on sustainable mining on a sound scientific basis, fairness and transparency in allocating mineral resources, encouraging the private sector to undertake exploration activities, and promoting zero waste mining. The policy also endeavours to accommodate Scheduled Tribes in the grant of concession for small deposits.

Key Features Relevant to SLEM:

Environment

- It recognizes that the extraction of minerals impacts other natural resources like land, water, air and forests.

It is necessary to take a comprehensive view to facilitate the choice or order of land use, keeping in mind the needs for development and protecting the forests, environment and ecology and conserving the biodiversity of areas to be mined.

- As per the latest scientific norms and modern afforestation practices, prevention and mitigation of adverse environmental effects due to mining will form an integral part of the mine development strategy.
- All mining shall be undertaken within the parameters of a comprehensive Sustainable Development



Framework, which will ensure that environmental, economic and social considerations are integrated effectively in all decisions on mines and minerals issues. The guiding principle shall be that a miner shall leave the mining area in an ecological shape that is as good as before the beginning of mining or better with the least impact on flora and fauna of the region.

- Mining operations shall not ordinarily be taken up in identified ecologically fragile and biologically rich areas.
- Environmental, economic and social considerations must be considered as early as possible in the decision-making process to ensure sustainable development in the mining sector. The goal is to envision the industry as financially viable, socially responsible, environmentally, technically, and scientifically sound, uses mineral resources optimally and ensures sustainable post-closure land uses.

Relief and Rehabilitation of Displaced and Affected Persons

- Mining operations can involve acquiring land held by individuals, including those belonging to the tribal and weaker sections. In all such cases, a careful assessment of the affected persons' economic, cultural, environmental, and social impact needs to be undertaken to ensure that suitable, appropriate relief and rehabilitation packages are evolved.
- In areas where minerals occur and are inhabited by tribal communities and weaker sections, it is imperative to recognize resettlement and rehabilitation issues as intrinsic to the development process of the affected zone. A mechanism will be evolved to improve the living standards of the affected population and ensure them a sustainable income. For this purpose, all the rehabilitation and resettlement provisions mentioned in the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR) Act, 2013, as amended from time to time, will be followed.

Devolution of Mining Benefits to Project Affected Persons

- The mining legislation has been amended to provide for the establishment of the District Mineral Foundation (DMF) to work for the interest and benefit of persons and areas affected by mining-related operations. The objectives for devolution of mining benefits under the DMF for the inclusive and equitable development of project affected persons and areas are to be guided by the Pradhan Mantri Khanij Kshetra Kalyan Yojna (PMKKKY).

Welfare of Tribal Communities

- The existence of minerals in tribal areas with rich biodiversity requires a comprehensive assessment. Land acquisition and displacement of tribal communities due to mining projects may lead to distress in tribal communities living in the Scheduled Areas.
- Grant of mineral concessions in the Scheduled Areas shall be guided by the provisions contained in article 244 (read with the Fifth and Sixth Schedules to the Constitution) relating to the administration of the Scheduled Areas and Tribal Areas and the provisions of PESA, 1996, and the FRA or any other relevant statutory acts protecting the interests of tribal. All Relevant Acts/Rules related to rehabilitation and resettlement like the RFCTLARR, 2013, subsequent amendments, or any other relevant acts/rules shall be strictly implemented.

Inter-sectoral Coordination

- Unified authority in the form of an inter-ministerial body under Ministry of Mines, with members such as Ministry of Coal, Ministry of Earth Sciences, MoEFCC, Ministry of Tribal Affairs, Ministry of Rural Development, Ministry of Panchayati Raj, Ministry of Steel, including state governments, shall be constituted to institutionalize a mechanism to ensure sustainable mining with adequate concerns for the environment and socio-economic issues in the mining areas and to advise the government on the rates of royalty and dead rent, among others.



Drivers of land degradation	Supporting provisions
Negative impacts of mining	<ul style="list-style-type: none"> A comprehensive view on facilitating the choice or order of land use, keeping in mind the needs for the development and protection of forests, environment, and ecology and conservation of biodiversity in areas to be mined Prevention and mitigation of adverse environmental effects due to mining as per the latest scientific norms and modern afforestation practices All mining to be undertaken within Sustainable Development Framework
Mining activity is a driver of land degradation	<ul style="list-style-type: none"> Mining not to be taken up in eco-fragile zones Institutional mechanisms at the central level focusing on inter-ministerial coordination in policy formulation and implementation to address issues of land degradation caused by mining Scientific mining Land Rehabilitation incorporated in early decision making Landfills and dumping sites rehabilitated properly through agroforestry and other ecological restoration measures Sustainable Development Framework followed in all steps of planning and implementation
Promoting land restoration	How to promote?
Restoration of mined-out areas	<ul style="list-style-type: none"> Scientific mine closure

Observations:

- It is a highly comprehensive policy that covers in detail the aspects of environment degradation due to mining. However, technical aspects of afforestation, restoration of flora and fauna and physical treatments should have been mentioned in a separate clause in the section on environment.
- The policy mentions clearly that FRA and PESA take precedence in the Scheduled Areas. However, most state governments have not given effect to the clauses on permission for mining on land in the Scheduled Areas by assigning this responsibility to an entity at the district or block level and not at the Gram Sabha or Panchayat level.
- The policy mentions about intersectoral coordination at the highest level i.e. at the level of the central ministries but does not propose coordination mechanisms at lower levels of governance.
- The role of PRIs, other than those in the Scheduled Areas, is missing in the policy.
- The policy emphasises the need to protect environment and forests, eco-fragile zones and sustainable mining but does not dwell into methodologies to be followed to balance the two social requirements.

3.2.12 National Tourism Policy, 2002

The National Tourism Policy was formulated in 2002 to position tourism as a major engine of economic growth and harness its direct and indirect multiplier effects for employment and poverty eradication in an environmentally sustainable way. The policy is based on some of the following basic principles:

- India must change its strategies and techniques and tools of its machinery of implementation if it has

to benefit from the tourism revolution occurring in the world.

- A framework would have to be evolved which is government-led, private-sector driven, and community welfare-oriented.
- The deep-rooted relationship between tourism and our cultural assets should be fully recognized.



- Effective linkages and close coordination should be established with government departments such as Civil, Aviation, Environment, Forest, Railways and Home.
- Sustainability should serve as a guiding star for the policy. Neither overexploitation of natural resources should be permitted nor the carrying capacity of the tourist sites ignored.
- Eco-tourism should be broader than nature tourism and should help eliminate poverty, end unemployment, create new skills, enhance the status of women, preserve cultural heritage, encourage tribal and local crafts, improve the overall environment, and facilitate growth of a more just and fair social order.
- Tourism industry and travel agents should be persuaded to evolve and adopt a Code of Ethics voluntarily.

Key Features Relevant to SLEM:

- Focuses on sustainability and carrying capacity of wildlife areas
- Emphasizes responsible tourism, employment generation
- Focuses on wildlife and nature tourism to realize full potential, adventure tourism in the Himalaya (Tiger and Elephant should be made a 'brand' of Indian Wildlife Tourism)
- Prioritizes ecotourism with focal points in the Himalaya, North Eastern States, Western Ghats, Jharkhand, Andamans & Nicobar Islands, and the Lakshadweep Islands

The impacts of the policy on the drivers of land degradation are summarized below:

Drivers of land degradation	Supporting provisions
Indiscriminate construction of hotels, restaurants in tourist hotspots in the Himalayan region and coastal regions- fragile ecosystem, issues of overcrowding, solid waste disposal, road construction and increased tourism activity in eco-tourism sites in protected forests	<ul style="list-style-type: none"> • Due diligence for new commercial construction activities in tourist hotspots- EIA and SIA is mandatory (enforcement of carrying capacity is a challenge, illegal tourism wildlife is a crucial issue)
Focus on conservation	<ul style="list-style-type: none"> • Branding and promotion of ecotourism/ nature-based tourism to enhance attention on conservation of wildlife areas

3.3 Regulations Impacting SLEM in India

3.3.1 The Environment (Protection) Act, 1986

The Environment (Protection) Act (EPA), enacted in 1986, provides an overarching legislative framework for protecting and ameliorating the environment at the National level. The EPA has a broader scope so far. It provides for the protection and improvement of the environment and the prevention of environmental hazards not only to human beings but other living creatures, plants and property and is therefore regarded as the umbrella legislation on the protection of the environment in India.

Key Features Relevant to SLEM:

- **Environment' as defined under the Act includes land and 'property':** The EPA has one of the most comprehensive and inclusive definitions of the environment under the Act where air, water and land and their inter-relationship with each other and other living beings, including microorganisms, is protected. Notably, the EPA also protects both land and property



from environmental pollution. The definitions of 'environmental pollutant' and 'environmental pollution', which are defined as any solid, liquid or gaseous substance present in such concentration as may be, or tend to be, injurious to the environment; and the presence in the environment of any environmental pollutant, respectively, complement the environmental protection to land and property.

- **Designation and protection of areas as Ecologically Sensitive Areas/ Eco-Sensitive Zones:** The EPA vests the Centre with the unique powers of designating and notifying areas as Eco-Sensitive Zones (ESZs) based on the degree of fragility and sensitivity of the environment and other ecological features that may be undergoing environmental threat from developmental or anthropogenic activities. Under Section 3 (2)(1)(v) of the Act, the Centre can exercise its powers for the purpose of protecting and improving the quality of the environment and preventing controlling and abating environmental pollution. Such measures may include restricted areas in which any industries, operations or processes or class of industries,

operations or processes shall not be carried out or shall be carried out subject to certain safeguards. As many as more than 300 ESZs have been notified using the provisions under the EPA.

- **Powers to create any institution as an authority for exercising powers or functions under the Act:** Section 3 (3) of the EPA empowers the Central Government to create any institution (s) for carrying out any specified function (generic or specific) on any issue concerning the environment or any of its components. Such institution shall function under the overall supervision of the Centre and can be vested with powers equivalent to the powers of the Centre to issue directions for the protection of the environment and its constituents. A number of institutions and authorities have been created for protecting various landscapes under the EPA. The National Coastal Zone Management Authority, created as per the Coastal Regulation Zone Notification, 2019, to protect coastal land and features, is one such example.

Observations:

- The Act is more focused towards addressing environment pollution from Industries. However, the Act has been instrumental in addressing issues related to overall environmental conservation for example wildlife areas and eco fragile and coastal zones.
- The EPA provides an additional mechanism for creating a cushion or buffer around the Protected Areas designated under the Indian Forest Act, 1927, or the Wildlife Protection Act, 1972. An additional area of land can be brought under higher standards of environmental management and conservation using the EPA. Any area requiring environmental safeguards can be brought under the Section 3 (2)(1)(v) of the EPA.
- The EPA can complement the Land Use Zoning from the environmental safeguard standpoint based on scientific assessments. Wherever the prime agricultural land is deemed to be under threat from environmental pollutants, the regime of the EPA either in the form of an institutional mechanism or designation/restriction of activities can be extended.
- The policy aspirations under the National Conservation Strategy, 1992, and the Policy Statement on Abatement of Pollution, 1992, with respect to land underline the prioritization of actions based on the degree and level of environmental degradation of land, forest and water. The EPA can practically be applied to all scenarios envisaged under the environmental policies.





3.3.2 The Provisions of the Panchayats (Extension to Scheduled Areas) Act, 1996

The Provisions of the Panchayats (Extension to Scheduled Areas) Act, 1996 (PESA) is an extension of the Panchayati Raj Act, enacted in 1992, to the Vth Scheduled Areas in ten States- Andhra Pradesh, Chhattisgarh, Gujarat, Himachal Pradesh, Jharkhand, Maharashtra, Madhya Pradesh, Orissa, Rajasthan and Telangana which have significant tribal population. The states are given the discretionary power to formulate their own state PESA by adapting the Central legislation to their State. PESA requires that other related laws, rules, and regulations applicable in the Vth Scheduled Areas be harmonized according to PESA.

PESA empowers the *Panchayats* and *Gram Sabhas* by vesting them with the power where they shall approve plans, programs and projects for social and economic development before such plans, programs and projects are taken up for implementation by the panchayat at the village level, be consulted before making the acquisition of land in the Scheduled Areas for development projects and before re-settling or rehabilitating persons affected by such projects in the Scheduled Areas, prevent alienation of land

in the Scheduled Areas and take appropriate action to restore any unlawfully alienated land of a Scheduled Tribe. Besides, PESA incorporates tribal customary rights to common property resources.

Key Features Relevant to SLEM:

- Land, mines and minerals, and forests are three areas where PESA makes special rules in the Vth Scheduled Areas
- Transfer/ diversion/ acquisition of land belonging to tribal people come within the jurisdiction of the *Panchayats* and *Gram Sabhas*
- Panchayats have the power to decide and approve local plans and resources for such plans
- Community management of common property resources of land, forest and water

Panchayats have the power to grant a licence for mining of minor minerals

Observations:

- PESA's implementation in states have been uneven as states vary in their adaptation to the provisions contained in the central PESA. Three areas - land acquisition, mines and minerals, forest produce - have not been devolved to Panchayat/ Gram Sabha uniformly across PESA states - for example, Himachal Pradesh is the only state where all three mining areas are devolved, while Rajasthan has devolved only mines and minerals and Chhattisgarh only land acquisition.
- PESA is to be seen in tandem with the FRA as some of the challenges are similar in nature. Accessing and trading minor forest produce/ NTFP and the development of community forest resources remain a challenge in the Vth Scheduled Areas.
- Due to widespread illiteracy and poverty and marginalization of the tribal communities, it is a challenge for people residing in the Vth Scheduled Areas to assert their claims on provisions made under PESA.

3.3.3 The Biological Diversity Act, 2002

India is a party to the Convention on Biological Diversity. The main aims of the Convention are the conservation of biological diversity, sustainable use of its components

and fair and equitable sharing of the benefits arising out of the utilization of genetic resources. The Biological Diversity Act (BD Act) was promulgated to give effect to



the Convention and provide for conservation, sustainable utilization, and equitable sharing of the benefits from using genetic resources.

Key Features Relevant to SLEM:

- Restriction on obtaining any biological resource occurring in India or knowledge associated thereto for research or commercial utilisation or bio-survey and bio-utilisation without prior permission
- Protection of Intellectual Property Rights related to bioresources
- Notification of areas of biodiversity importance as biodiversity heritage sites

- Constitution of Biodiversity Management Committee in every local body
- Constitution of a Local Biodiversity Fund
- Provision of Access Benefit Sharing as a proportion of revenue earned

Biological Diversity Act and SLEM

From the perspective of SLEM, the Act provides for equitable sharing of benefits arising out of access to bioresources. Such sharing of benefits would encourage the community to conserve and protect the bioresources and promote sustainable use.

Observations:

- The conservation emphasis under the Preamble of the Biodiversity (BD) Act is not reflected in the substantive provisions in the same realm. A major part of the BD Act is dedicated to regulating the commercial use of biological diversity by foreign and Indian persons and profit or benefit sharing arising from the use of biological resources.
- There is a centralized approach to biodiversity administration – the mainstreaming of biodiversity into developmental planning may not be realised until the state biodiversity boards (SBBs) and local bodies are strengthened as joint implementation agencies. The SBBs have an important role in ensuring compliance to the Act and ensuring equitable distribution and plough back of benefits to the communities
- In spite of the provision for the Notification of Biodiversity heritage sites, this power has neither been used by the Centre nor state governments, which is obvious to the small number of areas covered under this provision.
- While the Centre can formulate plans and strategies, the SBBs have no such explicit powers to formulate schemes and plans. However, conservation awareness about biodiversity is another important aspect that ought to have been explicitly provided for within the responsibility of states and local bodies.
- The confidentiality clause in the Act would require more explanation as per circumstances so that there is transparency in sharing information with the community regarding the use of bioresources.
- The Act provides for sharing of benefits only in case of commercial use of bioresources of traditional knowledge but there are no incentives for conservation under the Act.

3.3.4 Mahatma Gandhi National Rural Employment Guarantee Act, 2005

Mahatma Gandhi National Rural Employment Guarantee Act, 2005 (MGNREGA) is a rights-based policy that aims to eradicate rural poverty through employment in public work and sustainable livelihoods by expanding the asset base. The Act was passed in 2005, and its implementation started in February 2006 across 200 districts. In April 2007, 120 districts were added, while in April 2008, all districts

were under its purview. The Act is implemented through a scheme of the same name.

Several employment programmes for the rural poor were implemented before MGNREGA. Some of the prominent ones are the Employment Guarantee Scheme of Maharashtra (ESG), National Rural Employment



Programme (NREP), Rural Landless Employment Guarantee Programme (RLEGP), Employment Assurance Scheme (EAS) and National Food for Work Programme (NFWP). MGNREGA draws on these earlier programmes. However, it is different in essence as being a legally bound right-based demand-driven programme implemented through decentralized planning.

While the Act has turned out to be one of the main instruments to tackle rural distress, the volume and certainty of funds and the nature of the activities conducted by its beneficiaries creates a considerable impact and offers enormous opportunities for land management-related interventions.

MGNREGA and SLEM

The guidelines under MGNREGA have been continuously evolving. The categories of works that can be taken up are vast and cover a large variety of jobs related to land management, land improvement, and natural resources management. The categories of works that are also permitted cover interventions directly compatible with SLEM.

- Sustainable livelihoods for the rural poor through land development, creation of irrigation facilities, and promotion of farm forestry
- Livelihood security for the poor through the creation of durable assets on private and public land, improved water quality, soil conservation, and higher land productivity
- Creation of productive assets directly linked to agriculture and allied activities through development of land, water, and plantation
- Improvement of the quality of agricultural land as well as degraded fallow and wasteland
- Water conservation and creation of water harvesting structures to augment and improve groundwater
- Afforestation and horticulture on common and forest land
- Regeneration of village commons through plantation and land measures and creation of natural – resource-based assets, such as ponds on public land
- Sericulture and farm forestry

Observations:

- Under the MGNREGS, a significant thrust is being given on water conservation. The same was formalized through Mission Water Conservation Guidelines issued in 2016-17.
- Enabler for land development, creation of water structures and afforestation are measures taken to provide livelihoods and reduce rural poverty and inequality
- Brings synergy and convergence across sectors – agriculture, water and forest - and with programmes, such as the IWMP is one of the key challenges faced in implementation as focus is more on person-days of employment generated with a heavily target-driven approach
- Includes the most vulnerable population of rural poor, and therefore plays the role of partly substituting people's dependence on forests
- Strikes a balance between collective and individual assets creation with emphasis on individual assets. Robust and sustainable community assets further strengthens the resilience of rural poor
- Decentralizes implementation by allocating 50% of work to be undertaken by the panchayats, which encourages local planning
- Technical capacity of field staff and participation among the people are the key focus areas, however, this is also a gap given that land based NRM activities require technical competence for project conceptualization and implementation
- Provides for social audit of the scheme twice a year, which aims to improve transparency, draw people into participation and improve quality of implementation



3.3.5

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, also known as Forest Rights Act (FRA), 2006. The FRA is about the restitution of forest land and forest rights to forest-dwelling Scheduled Tribes and other forest-dwelling communities whose rights were not recognized earlier. It identifies and provides Individual rights over forest land for habitat and livelihood, community rights over forest land for habitat and livelihood, rights to claim settlement of ownership over disputed land, and rights of displaced communities over forest land. The Act makes forest-dwelling communities an integral part of forest management by recognizing that people who live in the forests and are dependent on the forest land and produce, have stakes and can be entrusted with conserving and using resources sustainably.

Key Features Relevant to SLEM:

- FRA balances conservation and livelihoods needs and

gives forest-dwelling communities stakes in the management of forest resources. They are to be engaged in the conservation of forests and maintenance of biodiversity.

- The Act grants rights to protect, regenerate, conserve or manage any community forest resource which the communities have been traditionally protecting and conserving for sustainable use.

The FRA intended to bring one of the most significant changes in the relationship between the forest governance institutions and the forest dwellers. The Act envisaged a one-time settlement of the land-related disputes and, therefore, introduces a new lease of conflict-less relations with the forest institutions. The FRA is also one of the leading regulations governing forest land relationships with dependent communities.

Observations:

- The FRA intended to bring one of the most important changes in the relationship between the forest governance institutions and the forest dwellers. The Act envisaged a one-time settlement of the land related disputes and therefore, brings in an era of conflict less relations with the forest institutions.
- The reciprocal relationship of people envisaged in the Act as per section 5 in forest conservation and protection has not been harnessed which is required to be done.
- Slow implementation and finalization of claims and handing over the "pattas" have threatened reversal of goodwill generated by the Act. By and large, the FRA areas are still lesser developed as compared to other revenue villages.
- In notified forest lands where settlement of rights has not been completed or are under process as per the Indian Forest Act, 1927, there is a need for harmonization of rights admitted under the FRA and the process of inquiry of rights under IFA 1927.

3.3.6

Compensatory Afforestation Fund Act, 2016

The Forest Conservation Act of 1980 says no forest land can be diverted for non-forestry purposes without the prior approval of the Centre. The Act also allows project proponents to pay for compensation for the loss of forest land if used for non-forestry purposes. The compensation

consists of amount towards compensatory afforestation, Net Present Value of forest land, any penal compensation in addition to land in lieu of the forest land diverted.

The Supreme Court in T.N. Godavarman Thirumulpad vs Union of India and Others [Writ Petition (Civil) No. 202 of



1995] dated the 30 October 2002, directed the creation of an Adhoc CAMPA Fund in which all the monies received from the user agencies towards compensatory afforestation, additional compensatory afforestation, penal compensatory afforestation, the net present value of the diverted forest land or catchment area treatment plan shall be deposited. The Adhoc CAMPA Fund was formalized through the Compensatory Afforestation Fund Act, 2016, providing a Compensatory Afforestation Fund Management and Planning Authority (CAMPA) to ensure safety, security and expeditious utilization (in a transparent manner) of funds accumulated with the Adhoc Authority.

The Act has strengthened the regime to oversee the utilization of the funds received as compensation for the diversion of forest land. The CAMPA Act and Rule have streamlined the utilization of funds and provides a detailed prescription on how various heads of money can be utilized for the overall benefit of forest and wildlife conservation, including strengthening forest and wildlife infrastructure. This amount in CAMPA Fund is also substantial and will be playing an increasingly greater role in forestry sector investments.

3.3.7 Regulations for Felling of Trees

Trees that are outside the purview of forest land are also required to be protected, more so in eco-sensitive and vulnerable areas and thus have a direct bearing on land degradation. Several states have special Acts and regulations that deal with the protection of trees.

While the Indian Forest Act of 1927, Wildlife Protection Act of 1972 and Forest Conservation Act of 1980 regulate the felling of trees in demarcated forested areas, the states and UTs have further promulgated legislations for felling and transportation of trees. Most of these acts provide for felling after prior permission of the designated authority and compensation in the form of plantation of new trees in certain multiples of the number of trees felled. Such Acts, or the respective Land Revenue Codes have also designated certain trees as "reserved" for which a more stringent set of procedures apply for felling. For example, in Gujarat, five trees, namely Teak (*Tectona grandis*), Shisham (*Dalbergia latifolia*), Khair (*Acacia catechu*), Sandal Wood (*Santalum album*) and Mahua (*Madhuca indica*) have been designated as reserve trees. Tree preservation acts in Karnataka, Kerala, and Tamil Nadu regulate the felling of trees in the Western Ghats region. Similarly, there are regulations for the felling of trees in urban areas in the jurisdiction of Municipalities and Municipal Corporations. Some of the state-specific regulations are discussed below:

- **Himachal Pradesh Land Preservation Act 1978 and Rules, 1983:** The Rule aims at the preservation and protection of certain areas within the territories of Himachal Pradesh. It provides for certain areas to be closed from felling and prescribes the procedure for issuing permits to remove forest produce for bonafide domestic and agricultural use. Such felling of standing trees is to be done under the supervision of the Forest Department/ Revenue Department. Any such permit holder would be required to plant at least three trees for one tree felled. Horticulture plantations and restocking of the entire area are also allowed. The landowner is responsible for the success of the trees planted, which would be checked frequently by the Forest/Horticulture Department staff. No tree shall be granted to such owner(s) from the Government forests for the next 10 years who sell trees from their private lands.

The Act also provides procedures for felling trees in private forests, trees on government land not classified as forests, and widening roads with PWD/ NHAI.

In 2017, to encourage the owners to grow trees on their lands, the Himachal Pradesh Government brought in amendments to the legislation for allowing felling of 23 species, besides exempting the forest produce obtained from these trees from the requirement of "Transit Pass". The exempted species included *Albizia*, *Bauhinia*, *Eucalyptus*, *Morus*, *Populus*, *Bamboo* (*Dendrocalmus*), *Kuth* (*Saussurea costus*), *Kala Zira*



(*Bunium persicum*), Paper mulberry, Khirki (*Celtis*), Toon, Jamun (*Syzygium cumini*), Teak/ Sagwan, Arjun (*Terminalia arjuna*), *Mallotus philippensis* and *Bombax ceiba*.

- **Delhi Tree Preservation Act, 1994:** This Act provides for the preservation of trees in Delhi and has provisions for establishing a Tree Authority to decide on permission requirements for tree felling. There is also a provision for planting 10 times the number of trees felled. Permission of felling cannot be refused if the tree is dead, diseased, or wind fell or is silviculturally mature, provided it is not on a steep slope, or constitutes a danger to life or property or constitutes an obstruction to traffic, or is substantially damaged or destroyed by fire, lightning, rain or other natural causes, or is required in rural areas to be cut to appropriate the wood or leaves or any part for bonafide use for fuel, fodder, agricultural implements, or other domestic use.
- **Punjab Land Preservation Act, 1900:** The Act provides that Government can, by notification, provide for the conservation of sub-soil water or the prevention of erosion in any area subject to erosion or likely to become liable to erosion. The Act is applicable in Punjab and Haryana (with separate state amendments). The Act regulates, restricts or prohibits the clearing or breaking up or cultivation of land, quarrying of stone or the burning of lime, cutting of trees or timber, or the collection or removal or subjection to any manufacturing process of any forest-produce other than what is prescribed except for bonafide domestic or agricultural purposes of rights in the area, setting on fire of trees, timber or forest produce; the admission, herding, pasturing or retention of sheep, goats or camels; the examination of forest-produce passing out of any such area; and the granting of permits to the inhabitants of towns and villages situated within limits or in the vicinity of any such area, to take any tree, timber or forest produce for their own use therefrom, or to pasture sheep, or to cultivate or erect buildings therein and the production and return of such permits by such persons.

The Act has played a vital role in protecting some of the vulnerable areas in the Shivalik and Aravalli regions of the two states.

Government programmes are the main vehicle to instrumentalize the policy objectives as public funds are committed through them. The programmes also define and establish institutional structures for carrying out the objectives. There are some key programmes of the Centre that play a significant role in achieving them towards SLEM.

The Integrated Watershed Management Programme (IWMP) - Watershed Development Component PMKSY has institutionalized the multisector approach of the watershed "plus" involving interventions on multiple fronts like reducing soil erosion, groundwater recharge, and optimal groundwater recharge utilization of water for agriculture, livelihood enhancement and creation of community assets. The Deendayal Antyodaya Yojna - National Rural Livelihoods Mission (DAY-NRLM) is a livelihood-promoting scheme for rural areas. The programme supports the skilling and development of micro-enterprises based on Self-Help Groups by providing capacity building, finances and institutional support. Convergence of various programmes has been the motto in all the government policies and programmes to drive efficiencies and better outcomes. Mission Antyodaya programme calls for integrated planning and implementation of the Gram Panchayat Development Plan in a campaign mode and sets a challenging target for rural transformation to make a real difference based on measurable outcomes to the lives of one crore households across 5,000 rural clusters, or 50,000 Gram Panchayats in 1,000 days. The other schemes of rural development like MGNREGS, rural housing, and rural roads have a vital role in improving living standards and achieving sustainable use of natural resources.

As discussed earlier, improved and sustained livelihood opportunities reduce circumstances wherein people have to fight just for survival and subsistence, which forces unsustainable use of natural resources.



3.4 Sectoral Action Plans Impacting SLEM

3.4.1 National Action Plan on Climate Change

In order to address the growing threat of climate change, the Government of India launched the National Action Plan on Climate Change (NAPCC) in June 2008. The NAPCC covers sustainable development, co-benefits to society at large, focuses on adaptation, mitigation, and scientific research. It outlines steps to simultaneously advance India's development and climate change-related objectives of adaptation and mitigation. The eight missions under the plan mentioned below have substantial impact on SLEM in the country.

1. National Solar Mission: The mission aims to promote the development and use of solar energy for power generation and other uses, with the ultimate objective of making solar energy competitive with fossil-based energy options.

2. National Mission for Enhanced Energy Efficiency: The mission would work towards mandating specific energy consumption decreases in large energy-consuming industries, with a system for companies to trade energy-saving certificates, financing for public-private partnerships to reduce energy consumption through demand-side management programs in the municipal, buildings, and agricultural sectors, and energy incentives, including reduced taxes on energy-efficient appliances.

Both the National Solar Mission as well as the Mission on Enhance Energy Efficiency would play a large role in reduction and dependence on coal mining compared to a non-solar regime and thus directly impact land degradation and other related issues connected to mining.

3. National Mission on Sustainable Habitat: The mission aims at promoting energy efficiency as a core component of urban planning. The mission also emphasizes on waste management and recycling.

4. National Water Mission: The mission would work towards achieving the goal of a 20% improvement in water use efficiency through pricing and other measures to deal with water scarcity as a result of climate change.

5. National Mission for Sustaining the Himalayan Ecosystem: This mission sets the goal of preventing melting of the Himalayan glaciers and protection of biodiversity in the Himalayan region.

6. National Mission for a Green India: The mission would implement the afforestation of degraded forest lands and expanding forest cover from 23 to 33% of India's territory. This mission is the umbrella instrument in the forestry sector for reducing forest degradation and building carbon sink.

7. National Mission for Sustainable Agriculture: The mission aims to support climate adaptation in agriculture through the development of climate-resilient crops, expansion of weather insurance mechanisms, and agricultural practices. The action plan resulted in the creation of the National Mission on Sustainable Agriculture.

8. National Mission on Strategic Knowledge for Climate Change: To gain a better understanding of climate science, impacts, and challenges, this mission envisions a new Climate Science Research Fund, improved climate modelling, and increased international collaboration. It also encourages private sector initiatives to develop adaptation and mitigation technologies through venture capital funds. Potentially, this mission creates opportunity for SLEM related research and knowledge creation.



Observations:

- The NAPCC provided the framework for integrating climate change in sub national plans. Subsequently, all states and Union Territories in India prepared their State Action Plans on Climate Change. From 2018, the second cycle of SAPCC preparation was initiated.
- The NAPCC and subsequent SAPCC led to the greater understanding of climate change among the policy makers at both the Centre and states. Similar understanding on climate change is yet to transmit to the district, block and panchayat levels.
- Climate change strategies are mainstreamed in climate sensitive sectors like agriculture, forestry and water.
- The importance of forest conservation and sustainable land and water management have gained prominence in recent years largely due to greater awareness on climate change.
- Covering all states under SAPCC, updating them periodically to be more relevant to changing circumstances, and putting it into action would be an important milestone in the near term.
- Funds must be committed for implementation of the SAPCC for them to become the key tool for state action in tackling climate change.

3.4.2 The National Biodiversity Action Plan (NBAP), 2008 and the Addendum to the NBAP, 2014

The National Biodiversity Action Plan (NBAP) outlined the threats and constraints to biodiversity conservation, namely habitat fragmentation, degradation and loss, shrinking of genetic diversity, declining resource base and over-exploitation of resources, invasive alien species, climate change and desertification, impacts of development projects, biodiversity information base, threats from new and emerging biotechnologies, among others.

The NBAP outlines the following objectives:

- Strengthening and integrating *in-situ*, on-farm and *ex-situ* conservation
- Augmenting the natural resource base and its sustainable utilisation: Ensuring inter and intragenerational equity
- Regulating the introduction of invasive alien species and their management
- Assessing vulnerability and adapting to climate change and desertification
- Integrating biodiversity concerns in economic and social development.
- Eliminating and minimizing pollution impacts leading to biodiversity loss
- Developing and integrating biodiversity databases

- Strengthening implementation of policy, legislative and administrative measures for biodiversity conservation and management
- Building national capacities for biodiversity conservation and appropriate use of technologies
- Valuation of goods and services provided by biodiversity, and use of economic instruments in decision-making processes
- Strengthening and consolidating International cooperation

The Addendum was added to the NBAP in 2014 after the National Biodiversity Targets were formalized. They are as follows:

- By 2020, a significant portion of the country's population, especially the youth, is aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.
- By 2020, values of biodiversity are integrated into National and State planning processes, development programmes and poverty alleviation strategies.
- Strategies for reducing the rate of degradation, fragmentation and loss of all natural habitats are



- finalised, and actions put in place by 2020 for environmental amelioration and human wellbeing.
- By 2020, invasive alien species and pathways are identified, and strategies to manage them so developed that populations of prioritised alien species are managed.
 - By 2020, measures are adopted for sustainable management of agriculture, forestry and fisheries.
 - Ecologically represented areas under terrestrial and inland water, and also coastal and marine zones, especially those of particular importance for species, biodiversity and ecosystem services, are conserved effectively and equitably, based on protection area designation and management and other area-based conservation measures and are integrated into the wider landscapes and seascapes, covering over 20% of the geographic area of the country by 2020.
 - By 2020, genetic diversity of cultivated plants, farm livestock, and their wild relatives, including socio-economically as well as culturally valuable species, is maintained, and strategies developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.
 - By 2020, ecosystem services, especially those related to water, human health, livelihoods and wellbeing, are enumerated, and measures to safeguard them are identified, considering the needs of women and local communities, particularly the poor and vulnerable section.
 - By 2015, access to genetic resources and the fair and equitable sharing of benefits arising from their utilization as per the Nagoya Protocol are operational, consistent with national legislations.
 - By 2020, an effective participatory and updated national biodiversity action plan is made operational at different levels of governance.
 - By 2020, national initiatives using communities' traditional knowledge relating to biodiversity are strengthened, to protect this knowledge in accordance with national legislations and international obligations.
- By 2020, opportunities to increase the availability of financial, human and technical resources to facilitate effective implementation of the Strategic Plan for Biodiversity 2011-2020 and the national targets are identified, and the strategy for resource mobilization is adopted.

Observations:

- The NBAP and Addendum have clearly articulated the action plan, however, the plan has not been able to strengthen the institutional mechanisms for implementing them, especially in areas where capacities have been weak.
- For example, India has a strong history of *in-situ* and *ex-situ* conservation of wild animals, which has progressed considerably after the NBAP. But specific conservation plan of RET species are still to cover the entire list.
- The famous and older protected areas are relatively well funded with robust management systems, but PAs which have been declared in the last decade require higher attention and allocation of resources.
- Many of the actions suggested are work in progress with adequate funding remain a major constraint.
- Conservation of agricultural biodiversity has been weak even though the Biological Diversity Act 2002 is in place.
- Similarly, high quality research in impact studies of development, habitat fragmentation and climate change have been missing.
- Loss of wild biodiversity is poorly understood to be fully accounted for in the compensatory afforestation mechanism currently implemented.
- Implementation linkages of many of the action points of the NBAP are a gap.
- The plan was targeted to be achieved in 2020. An assessment of the achievements made by 2020 and the next set of targets is required for the future.



Though the action plan does not directly impact the drivers of land degradation, it provides an overall focus from the

perspective of biodiversity conservation to strengthen the case of protecting and conserving landscapes.

3.4.3 The National Wildlife Action Plan 2017-2031

The action plan has replaced the National Wildlife Action Plan (NWAP) 2002-2016. The action plan lays out key priority projects across the following areas:

- Strengthening and improving Protected Area Network
- Landscape level approach for wildlife conservation
- Integrating climate change in wildlife planning
- People's participation in wildlife conservation
- Conservation awareness and outreach
- Conservation of threatened species
- Control of poaching and illegal trade in wildlife
- Wildlife health management
- Mitigation of human-wildlife conflict
- Conservation of inland aquatic ecosystems
- Conservation of coastal and marine ecosystems
- Development of human resources
- Strengthening research and monitoring
- Improving compliances of domestic legislations and international conventions

- Ensuring sustained funding for wildlife sector
- Integrating national wildlife action plan with other sectoral programmes

Some of the important areas directly relating to SLEM covered in the action plan include review of status of PA and wildlife corridors, management of invasive alien species both plants and animals, regulation of grazing inside PAs, relocation of villages outside PAs, covering all PAs with adaptive management plans, monitoring of wildlife habitat at landscape level, periodic review of conservation status of species as per IUCN Red List, implementing species recovery programme, developing and maintaining GIS based database on wildlife diseases, monitoring population of species involved in conflict with people, identifying and conserving ecologically significant water bodies, management of aquatic invasive species, assessing vulnerability of habitat in respect of climate change, action on multiple fronts to engage community in wildlife conservation, and stress on conservation education to selected target groups on priority.

Observations:

- The NWAP extensively covers all the areas of wildlife management. Apart from action points specific to PA management and Forest and Wildlife Departments in States, the plan also calls for coordinated action from multiple other departments and agencies. This could particularly be a challenge without a coordinating unit at a nodal level.
- The learnings from implementation of the previous action plan 2002-2016 would help in identifying the key areas which would require focus and strengthening during the implementation of the current plan.
- The recommendations in the plan if implemented efficiently would support in managing critical ecosystems and ensure ecosystem services flowing to communities.

3.5 Synthesis of the Analysis

The policies that are directly and indirectly related to SLEM have been discussed in this chapter. In addition, with shifts in national priorities and incremental learning, schemes and programmes have evolved to address the various

aspects of land degradation. The evolution is evident from some key milestones achieved in the national programmes related to SLEM:



- Acknowledging that land resources play a key role in eradicating poverty leading to programmes such as DPAP and DDP
 - Adopting a watershed approach and planning based on micro-watersheds and using remote sensing data and spatial data in planning at the micro-watershed level
 - Opting for the integrated treatment of geographic unit by incorporating contouring, gully plugging, vegetative, and engineering-based solutions for soil-moisture conservation, covering agricultural and non-agricultural lands
 - Increasing emphasis on balancing the need for conservation of natural resources and demands for livelihoods of poor households, adopting Joint Forest Management (JFM) and social fencing by involving local communities
 - Adopting integrated farming-based approach by incorporating fodder and fuelwood supply, farm-forestry and agroforestry and silvipastures, stall feeding and promoting improved cook stoves (chullahs)
 - Developing and conserving common property resources became an integral part of the policies aimed at poverty reduction, rural development and natural resource management
 - Focusing on water management, aquifer recharge and water budgeting as well as crop planning
 - Recognizing the need for easy and clean cooking fuel, not only for urban but also for rural households and consequent thrust on implementation of Pradhan Mantri Ujjwala Yojana (PMUY) to provide gas cylinders to the poor
 - Focusing on social and institutional aspects, participative net planning at the micro-watershed level, constituting watershed committees under Gram Sabha, developing Water User Associations and making social audit mandatory in government programmes
 - Recognizing women as key stakeholders, mainstreaming gender across sectors and policies and increasing acceptance of women farmers in the policy discourses
 - Incorporating farm and off-farm livelihood related activities and developing micro-enterprises, involving Self-Help Groups (SHGs) programmes such as Mahila Kisan Sashaktikaran Pariyojana (MKSP) by focusing on strengthening the capabilities of women farmers to increase sustainability
 - Adopting climate-adaptation related solutions considering both floods and intense precipitation and temperature and moisture stress, and re-orienting employment generation programmes such as MGNREGA in this direction
 - Rights-based frameworks are in place since the mid-1990s with view natural resources in the perspective of individual and collective rights, i.e. land rights and forest rights
 - Incorporating newer concepts related to efficient use of natural resources, e.g. water for irrigation through drip and micro-irrigation, solar pumps (and farm-based grid-connected solar generators), biopesticides, organic farming, farming practices like zero tillage and system of rice intensification (SRI)
- At the same time, further work needs to be done for mainstreaming of concepts like water budgeting, crop planning and substitution based on water and market intelligence, just enough use of chemical fertilizers as per needs of the soil, social fencing and finding a viable model to provide rest to overexploited land-based ecosystems so that they can recoup their productivity.
- The analysis and review of the policy instruments related to SLEM bring out some significant points as listed below:
- **Need for a comprehensive policy on land degradation:** There is no comprehensive policy or legislation for addressing land degradation and desertification in India, which is also echoed under the National Action Programme to Combat Desertification (NAPCD), 2001. Hence the efforts for mainstreaming SLEM towards arresting and reversing land degradation will be contingent on the performance of various sectors, based on their respective policy and institutional strengths and implementation rigour.



Therefore, the collective performance of all key sectoral policies such as agriculture, soil, water, forest, common land, infrastructure and industrial development needs to be mobilized through an institutional mechanism at the state level to mainstream SLEM. Currently, the institutional framework for such mobilization is either absent or inadequate.

- **Land not a major focus of policies:** Agriculture intensification and water-induced land degradation of productive lands have emerged as one of the major drivers of land degradation primarily due to unsustainable land use and expansion of cultivation. The national policy framework applicable to agriculture land use and practices merely reflects the acknowledgement of proximate causes of land degradation and provides generic guidance and direction in which actions should be initiated. The contributory role of input related policies, particularly water, fertilizer and energy (electricity), in ensuring soil and land sustainability has not been suitably addressed.
- Despite the long-standing concerns of soil/ land diminution throughout the successive Five Year Plans, the National Agriculture Policy of 2000 (NAP) merely aims at enhancing agriculture productivity by 4% per annum based on 'efficient use of resources', including water, thus placing insufficient emphasis on the critical aspect of regulating overuse of surface and groundwater as integral to 4% annual growth of the sector. The NAP also promotes export-oriented crop diversification without mentioning feasibility-impact assessment of such diversification on soil health, water requirements, local biodiversity and contiguous land ecosystems. The risk management strategies enunciated under the NAP is crop-based and not land-based. In other words, loss of soil and land productivity in the short, medium and long run is not seen as a risk and therefore not covered under the agricultural insurance scheme. Thus, the key policy instrument that aims at driving the growth in the agriculture sector, a sector contributing to land degradation concern in the country, is productivity-driven and crop/output based without any concern to land itself.
- While NAP is growth-centric, land sustainability emerges as a theme under the National Farmers Policy, 2007 (NPF), which aims to enhance profit and income to compete with the growth in the non-farm sector. One of the objectives of NPF is to improve economic stake in conservation by protecting and enhancing land, water and biodiversity. The NPF also has extensive provisions on bio-resources, bio-security and climate change. However, it falls short of suggesting preventive measures for further degradation of land, water and bio-resources. For example, for groundwater management, the emphasis is on water use efficiency, rainwater harvesting, and enhancing conservation. However, the input control measures that incentivize water use efficiencies, like water and electricity pricing, are not considered a policy measure. Similarly, lands must be improved by implementing land laws, particularly ceiling, leasing, tenancy and redistribution of wastelands, while the focus on land use and revamping land use boards are cursorily reflected under other measures.
- Water as a common element to agricultural production and farmers' welfare has inadequate focus under both policies. At the same time, water management through sustainable land use is not considered under the National Water Policy, 2012 (NWP) either. Thus, the NWP has its ambitious agenda that does not connect well with the goals, objectives and strategies of agriculture and farmer's policies. There are contradictory notions. The NPF calls for increased, assured and improved irrigation development. However, it does not sufficiently focus on the poor performance of the irrigation sector, a reason for farmer's shift from irrigation water to groundwater and the land degradation in the command areas. The NWP suggests a widening gap between irrigation potential created and utilized, thus hinting at the need for using the existing irrigation facilities before new irrigation is developed, a position that is not in conformity with the NPF.
- Despite clear linkages and potential to impact land degradation, the NWP refrains from making any



concrete intervention. While the references are made on the need for a comprehensive legislation for land-water planning at a basin and sub-basin level, the need for arresting soil and land degradation as a causal effect of water overuse is not felt under the NWP. As agricultural water is the major challenge for the overall water security in the country, the inter-dependence of other sector on agriculture as far as water use is concerned, demands supporting mechanisms other than the core sector-specific policies such as NAP 2000 or NPF 2007, both of which have no such provisions even on the demand side management.

- Since NWP, 2012 is a driving instrument from both demand-side management (DSM) and supply-side management, the potential of the NWP to play a supporting role from the land sustainability perspective becomes important. Agriculture being the key consumer of freshwater (90% consumptive use) and a driver of soil and land degradation, the water-land linkages under the NWP should be established as a trade-off and co-benefit. Mainly demand-side management strategies and techniques/technologies such as micro/ drip irrigation and sprinklers are suggested for regulating excess water use. The role of pricing mechanisms to regulate the exploitation of surface and groundwater is acknowledged, but its consequential impact on land sustainability is not linked. The task is left to the states to establish water regulatory authorities and consider regulating electricity supply to farmers by separate feeder arrangements, a weak policy persuasion that the states have not been picked up yet. The most significant policy imperative under the NWP, 2012, is the desire to have a national framework law. Legally speaking, it is a misplaced notion as there is no precedent of a framework law in the country, which the states are obliged to follow or get inspired from, and in the absence of rules for such a law, it is implausible to make any impact on the ground.
- Therefore, the three key policy instruments directly relevant to agricultural land use and degradation have

insufficient focus and lack mechanisms to ensure SLEM in agriculture. The issue of land degradation, especially in agricultural lands, cannot be seen in isolation. It is closely linked to what farmers grow, how much they grow, what and how much inputs they use. These choices are determined by the market returns of the farmers, choice of inputs which depends both on the cost of inputs as the returns that farmers get, capacity and skills of farming community required for crop change if needed, access to markets and efficiency of agricultural markets, financing regime wherein all these factors are interconnected in a complex web. On top of these, there are concerns for food security, access and price volatility, which makes unilateral action on any one of the levers risky. Any comprehensive agriculture reform in future would be the best point to incorporate land degradation issues as one of the outcomes.

- **The policy conundrum around wastelands:** Wastelands remain undefined but are classified under various categories in land records and governed under the general framework of environment and biodiversity laws. There is no specific instrument to cover wastelands as such. Many words are used interchangeably for wastelands without much clarity, such as degraded wastelands, uncultivable wastelands and degraded lands. As per the accepted definition provided by the NWDB and competed by the IWDP, "Wastelands are degraded land which can be brought under vegetative cover, with reasonable effort, and which is currently under-utilised and land which is deteriorating for lack of appropriate water and soil management or on account of natural causes"⁴⁵. This definition puts completely degraded lands with no revival potential out of wastelands, although such lands are available and carry out very critical ecological functions. Also, the parameters to determine what constitutes 'reasonable efforts' and 'underutilization' remain unsubstantiated. The potential for utilization is the defining criteria for the wastelands to be qualified under the IWDP. The definition also raises questions on

⁴⁵ <https://dolr.gov.in/en/integrated-wasteland-development-programme>; total area claimed by the 13 categories of wastelands is 636518.31 sq. kms



the restoration of degraded land only to provide ecological services and not for purposes like commercial or provisioning of usufructs.

- Under the wasteland development programmes (IWDP, DDP, DPAR, or the subsequent IWMP and PMKSY), investments were made in identified patches of wasteland but management or control of such land rests with the revenue departments. The land categorization of wasteland in revenue records defines its administration. However, scientifically speaking, wastelands and marginal lands are also under private ownership. The current description of wasteland is based on the assessment done by NRSC, which included thirteen categories of lands such as snow-covered/glacial, barren rocky, gullied/ravenous lands, land with or without scrub, waterlogged and marshy land, salinity/ alkalinity affected coastal/ inland, degraded shifting cultivation areas, degraded pastures/ grazing lands, degraded plantation lands, sandy coastal/ inland and abandoned mining/industrial wastelands. The conundrum about what constitutes wastelands becomes more pronounced as the National Forest Policy also claims stakes in wastelands and uses at least four terms for such lands – degraded/ marginal lands, denuded lands, wastelands, and unproductive lands.
- Agriculture also has stakes in wastelands. The expansion in agriculture has happened at the cost of cultivable or utilizable wastelands through a land redistribution programme. Sometimes these expansions have occurred contrary to the resource sustainability and input regulation approaches adopted under the National Policy for Farmers of 2007 and the National Water Policy, 2012. The unfinished agenda of land reforms has also, to an extent, been a driver of such change.
- Wastelands require higher investments in financial and human resources, yet some of them may remain less productive. Prioritization of efforts to restore wasteland on identified land based on scientific survey will determine effective use of resources. Utilization of such

land as per their potential would be necessary for halting their further deterioration. For example, it has been found that wastelands without production capability assigned to the poor have remained uncultivated and where such potential existed, possession and ownership were contested. Choice of wasteland for locating industries also risk complete change in their land use which may not be compatible with the overall land ecosystems in the area. Such a shift in utilization sometimes interferes with the Common Property Rights regime for communities. Thus, the regulatory vacuum on wastelands needs to be filled by bringing in a clear and harmonious definition based on clear utility-based parameters that would include the ecological utility of such lands aligned with SLEM objectives.

- **The underutilized potential of the National Forest Policy, 1988:** The National Forest Policy, 1988, is disjointed with all other policies applicable on lands and water relevant for SLEM. Though forests have a critical role in replenishing and sustaining all other adjacent land-based systems, this benefit arising from forests has not been leveraged. The policy mentions providing sufficient fodder, fuel and pasture, especially in areas adjoining forests, to prevent grazing in forest lands. There has been less focus on fodder development while implementing programmes in forest fringe villages under forests or agriculture. Similarly, alternative fuelwood requirement, especially in remote villages or forest fringe areas where cooking gas supply becomes unviable, has not yielded many results. It holds even for the places where grazing and fire have emerged as a serious challenge to sustainability.
- With forests facing threats from multiple corners, the forest policy should have interests in developments happening related to non-forest areas both in the upstream and downstream of forest ecosystems. For example, though checking soil erosion and denudation of catchment areas is one of the objectives of the National Forest Policy, the coordinating policy imperatives to take the objective forward with watershed, wasteland development, and soil conservation are missing. The Working Plans are often cited as a reason





for non-coherence with the watershed projects implemented in the areas (sub-watershed) that have forests. The Forest Policy has also not been able to push agro-forestry and remains largely disconnected from the Agriculture Policy and the Farmer's Policy. The demand and supply of wood and wood-based raw materials for industries have also remained outside the policy's purview. The imperative of reserving productive lands for food production is challenged by the Model Land Leasing Act, 2016, which promotes agroforestry in all leased lands categories.

- Absence of institutional protection to grazing lands:** The absence of a national policy on grasslands or grazing lands is an example of a policy vacuum on land governance related to livelihoods. With the decline in the common grazing lands, there is an overall negative impact on biomass availability. The conspicuous absence of a grazing policy coexists with the fact that 60% of India's grazing needs are fulfilled from forest areas. The National Forest Policy, 1988, or the forestry programmes have also not been able to address the connection of forest degradation with fodder and fuelwood shortages that can be met by protecting and developing grasslands. Further, the lack of institutional protection to grazing lands is another central area of policy concern. Since degraded grazing lands are also clubbed with large categories of wastelands, their diversion becomes easier with the absence of mechanisms for regulating the diversion of permanent or traditional pasture lands.
- Harmonization of land acquisition laws with sustainability initiatives:** Judicious use of land acquired for public or private purposes is necessary to protect its quality and functions, especially when the acquired land was agricultural or high-quality forests. There are cases where acquired lands have not been used for the purpose. They were acquired for reducing the land to large chunks of wastelands. As per the Ministry of Commerce Annual Report (2017-18), the state announced that special economic zones (SEZ) had the worst land utilization of the 48053.53 ha of land

allotted to SEZs. Only 48% was utilized⁴⁶. The remaining land is underutilized or misappropriated by developers for commercial purposes such as waste yards or storage, often at the cost of wetlands, vegetation, and adjacent agricultural lands. It runs counter to the very objectives of the ceiling legislations on which the National Farmer Policy, 2007 relies for land improvement. Such unutilized land would require to be assessed from a land degradation perspective. Besides, safeguards may be needed so that land acquired but not utilized immediately may be treated scientifically and not left to degrade.

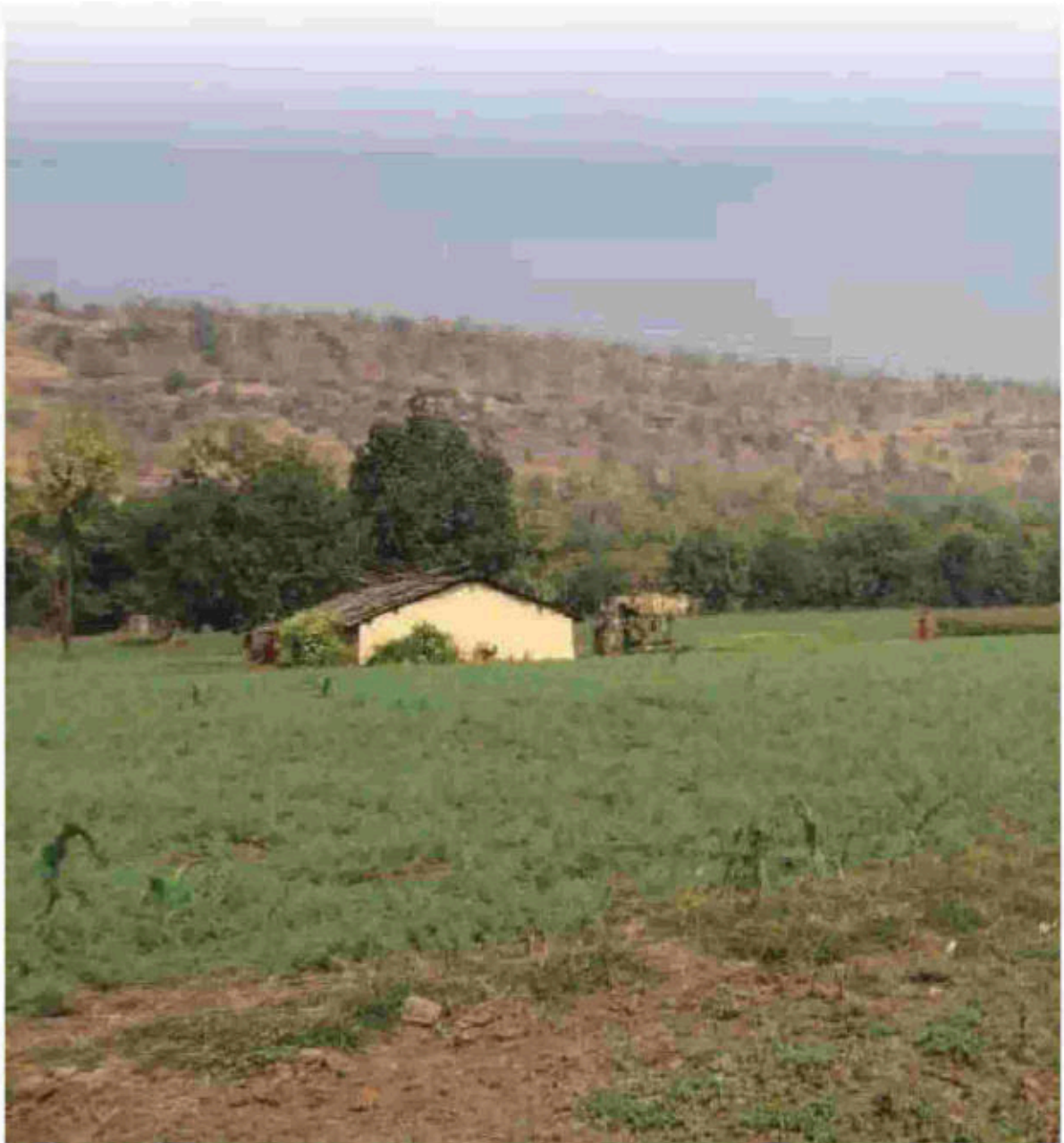
- Lack of a national strategy to deal with land conflicts in India:** Nearly 2.5 million ha of land in India is caught in land disputes of various kinds. A majority of cases decided by the Supreme Court of India concern land conflicts, a portion of which come from the private landholders against land acquisition for various projects. A smaller number of cases are decided on common lands where the rights regime is not sufficiently clear. Since land is a driver of economic growth and ecological security, a clear policy on dealing with land conflicts, especially in common lands, needs to find a place within the national-level land use planning. A non-conflicted regime of land ownership will increase investment of technology and best practices in land management.
- Participatory planning remains an aspiration:** The policy framework has reached a consensus on the need for involving people and communities, especially for managing natural resources while maintaining safeguards regarding equity in distribution, access and use, and keeping a watch on the vulnerability of the marginalized. This understanding has been woven in almost all the programmes that talk about participatory bottom-up planning and management, transparency and social audit to increase people's ownership and trigger self-regulated behaviour change where the new paradigm takes care of the sustainability of the resource. However, stronger interventions to correct the imperfections established due to earlier policies

⁴⁶ Performance of SEZ, Ministry of Commerce and Industry, Public Accounts Committee Report (2017-18), Nineteenth Report



have been generally avoided. Even after almost 30 years of the Panchayati Raj System being mainstreamed through the 73rd Amendment, the Panchayati Raj Institution (PRI) has remained weak community-level governance institutions. However, the role of PRI institutions, especially the Gram Panchayat, has continually been espoused in the various programmes. The inherent technical and managerial capacity gaps, incomplete devolution of power and

resources to PRIs, lack of democratic process due to different social dynamics, transparency, and other reasons have minimal Gram Panchayats capacity for meaningful participation. Thus, the participatory planning remains an aspiration as of now. This gap affects the performance of programmes in a substantial manner, which has not been addressed in the perspective which it deserves.



CHAPTER 4



Social Aspects Critical to SLEM



Land cannot be seen in isolation as a natural or ecological resource in landscapes where human habitation exists and is dependent on the land for livelihoods and shelter. Landscapes seen at present are also a result of human interaction over many centuries. Any measure taken to develop, conserve, and manage natural resources of land, water, and forest involves treating land as an integrated resource with economic, ecological, and social dimensions.

Different social groups' dependence on and access to natural resources and their role in sustainable management of those resources are critical to SLEM. Scheduled Castes and Scheduled Tribes (STs) are invariably resource-poor, and a majority of them eke out a living as small and marginal farmers or landless wage labour; STs living in and around the forests are dependent on the forests for their livelihoods. Women, because of gender relations, are equally disadvantaged vis-à-vis

rights and access to resources. A large number of women farmers, for example, cultivate the land without having any rights over it. Women are also the primary collectors of fuel and fodder. Pastoralists are dependent on the forests and common land for the grazing of their cattle. Most of these services accessed from forests and common lands are non-monetized.

This chapter views the social aspects of SLEM related policies and programmes from the perspective of rural communities. It studies the gaps, challenges and areas of improvement of selected policies, legislations, and programmes mentioned in the table below and analyses them from the perspective of equity, gender mainstreaming, community participation, tribal communities' rights and their dependence on the forests, local governance in tribal regions, common property resources, and traditional community-based practices.

Table 4. Policies, acts and schemes analysed for social aspect of SLEM

Policies	Acts	Schemes
<ul style="list-style-type: none"> National Forest Policy (NFP) 1988 National Agriculture Policy (NAP) 2000 National Policy for Farmers (NPF) 2007 National Agro-Forestry Policy 2014 	<ul style="list-style-type: none"> Provisions of Panchayat (Extension to Scheduled Areas) Act (PESA) 1996 The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006, also known as Forest Rights Act (FRA) Biological Diversity Act 2002 	<ul style="list-style-type: none"> Mahatma Gandhi National Rural Employment Guarantee Act/ National Rural Employment Guarantee Scheme (MGNREGS) Integrated Watershed Management Programme (IWMP) - now WDC-PMKSY

4.1 Equity and Inclusion

Equity is the foundational principle of policy in a Welfare State. Equity is concerned with fairness and social justice in the allocation of resources to recipients. Equity in development interventions is based on two principles (Jones, 2009):

- Life chances** – People should not be discriminated based on factors that are beyond their control. Therefore, a level playing field is required for everyone to access resources, such as water.
- Distribution according to people's needs** – The poor and other vulnerable groups must receive equitable benefits from government interventions.

Since one of the goals of SLEM is enhancing and securing livelihoods and ecosystem services for the rural poor, equity in resource distribution and sharing of benefits among various socio-economic groups are critical aspects of both the programmes and their implementation, especially for the interventions to be sustainable.

For example, in watershed development projects, the main focus remains on land, soil and water that does not benefit the landless and pastoralists directly, but they are indirect beneficiaries of the project components, such as groundwater recharge and the development of common land. Hence, the IWMP includes them as beneficiaries. Inequity can lead to conflict in resource use, deprivation of ecosystem services to dependent people, and lack of



motivation for conservation and protection of land, water, and forest that constitute the most important resource base for the poor. The success of a project invariably hinges on equity. Equity considerations involve the entire cycle of a project – from conceptualization to reporting.

Equity considerations involve selection/ choice/ prioritization of recipients, resource distribution, benefit-sharing, and short-and long-term outcomes. The inclusion of people as beneficiaries of programmes is the first step towards equity. The schemes and programmes mentioned above use a variety of criteria to select and include recipients/beneficiaries under them. The criteria are based on people's social and economic conditions such as poverty, gender and other conditions, including physically challenged status that leads to economic and social vulnerability, people living in forests, and those living in remote and inaccessible places. Besides, there are particularly vulnerable categories among the tribal population that need special attention.

If programmes are weak in conceptualization and development of indicators to translate equity in implementation, this affects mapping of needs of beneficiaries, allocation of resources, and activities in which people can be engaged as stakeholders.

An inclusive process of planning increases the potential for equity and the success of the project. Although community participation and participatory planning are ubiquitous across programmes, in reality, they remain a challenge. In addition to the already existing database used for planning at the village/ panchayat level, additional planning tools, such as micro-planning through participatory resource mapping, need assessment, benefit-sharing, and prioritization of work to be undertaken are required to ensure equity. While the programme bureaucracy at the higher level is well acquainted with participatory approaches, the staff at the implementation level face challenges due to low orientation or absence of requisite skills to undertake such planning. In such cases, NGOs are a good option to bridge the gap in the community-based planning process.

4.2 Women and Gender Mainstreaming

The livelihoods of a large number of women in rural areas are directly dependent on agricultural, forest, and common land. Food, fuel and fodder remain the three most essential requirements of rural households. Women work as farmers or agricultural wage labours, collect forest produces, and collect fuel and fodder. How policies and programmes involve women determines whether women will use the resources sustainably or cause their degradation. For example - if women are deprived of fodder from the common land, they will use other available land leading to its degradation and unsustainable use, if poor women are not provided with alternative livelihoods, they will continue to cultivate the small and marginal farms unproductively;

and if women farmers are deprived of institutional credit, they will not invest in land and soil development. In a society that favours men, there is every likelihood of women beneficiaries being relegated to the end of the queue if efforts are not made towards their inclusion.

Most social sector policies directly related to poverty alleviation, livelihoods and access to resources and sustainable use of natural resources, aspects that SLEM eschews, contain a gender component though it varies in terms of scope. Even though the policies have incorporated gender components, gaps exist between policy and implementation.

4.2.1 Sectoral Issues

4.2.1.1 Women and Forest

Two crucial legislations that deal with the forests – NFP 1988 and FRA 2006 – are nearly silent about women's

dependence on forests and their role in conservation and sustainable management of forests. The NFP 1988 is



considered a path-breaking policy that aims to balance human needs and forest regeneration. While the policy recognizes tribal communities' requirements from forests and mentions rights and concessions, it does not explicitly mention how tribal women and women from other forest-dwelling communities interact with the forest ecosystem. Joint Forest Management (JFM) as a programmatic follow-up to the NFP 1988 though provides women membership in the village committee constituted. The FRA 2006 establishes the rights of forest-dwelling STs and other forest-dwelling communities on forests and has elaborate provisions for their engagement in forest governance. However, the Act does not mention women as a distinct social group within the forest communities except providing women membership in village committees formed under it. Similarly, the Biological Diversity Act, 2002 has the provision for women's representation as members of the Biodiversity Management Committee. Mostly, inclusion of women in policies has remained confined to membership in village-level committees.

Normally it is believed that women's needs and concerns will get reflected in the implementation process, but the lack of articulation of these in the policies makes women invisible in the policy domain. Women's dependency on the forest, how women use its resources, and their role in the conservation and management of the resources need to be understood. For example – women use forests for household items - food, fuel and fodder; they are also the collectors of NTFPs, and earn small cash from selling fuelwood or fruits they collect from forests. Since women use forest resources for subsistence, they will have an interest in using the resources sustainably. But women need to be specifically addressed in any community-based forest conservation programme. Furthermore, gender-related issues that may exclude women from forestry programmes need to be identified. For example, while women are encouraged to do plantation, fund management is seen as a man's domain, the implementers, mostly men, often find it convenient to consult men in the community than women, the timings of the meetings if not fixed to suit women may exclude them as women remain busy in household and farm work.

4.2.1.2 Women and Agriculture

The agriculture census (2015-2016) shows that the operational holdings managed by women have gone up in numbers – the percentage share of female operational holders increased to 13.96% in 2015-16 from 12.79% in 2010-11 with the corresponding figures of 10.36% and 11.72% in the operated area. It shows that more and more women are participating in the management and operation of agricultural land though there are regional variations. Of the total 20.44 million female operational holdings, the top three states in terms of proportion of women landholding are Andhra Pradesh (12.6%), Maharashtra (11.6%) and Bihar (11.2%). The three states from the bottom are Chhattisgarh (2.7%), Rajasthan (3.8%) and Gujarat (4.3%).

Women farmers are one of the major stakeholders in agriculture. Both the NPF 2007 and NAP 2000 have included women farmers in the policy domain. The NPF has expanded the definition of farmers and includes agricultural operational holders, cultivators, agricultural labourers, sharecroppers and tenants, among others.

Inclusion of women farmers in policies to facilitate credit and institutional inputs is a step forward. However, there are challenges that need to be addressed. They are:

- Poor women lack resources to invest in land development and technology, and without easy access to credit in the absence of legal titles to land, women farmers are unable to develop land and soil health and control further land degradation. Establishing women's legal ownership of land has been challenging. The rights granted by the inheritance law are mediated through cultural practices and social structures. Indian society is largely patrilocal and patrilineal, in which the ownership of land passes through the line of male descendants. The 2005 Amendment to Hindu Succession Act of 1956 took a significant step towards women's ownership of agricultural land by overriding state laws inconsistent with the Act and, therefore, has a positive impact on women's land



ownership. Yet, a large number of women continue to cultivate household farms without being formally recognized as farmers

- State governments are taking steps to provide women legal ownership, either individually or jointly, of land distributed as ceiling surplus land or public land distributed through a land grant. These are positive moves. However, their impact on women farmers is yet to be seen as ceiling surplus lands constitute a tiny proportion of the net operational area. In some instances, there are litigations involving the surplus land, and infertile land require finances to cultivate, which poor women lack.
- Establishing land rights, particularly in cases where women manage the household farm and the male head is either not alive or is absent due to migration or any other reason, is critical for women farmers to get institutional credit and insurance coverage.
- As tenants and sharecroppers, women occupy a precarious position as these arrangements are largely informal and are agreed upon by male members in many cases. Tenure security is essential for women to treat land as a long-term resource, invest in land and

soil improvement, and in new technology and equipment. Ownership and security of tenure also reduce the risk for women farmers – they can invest in their farms and take the risk of changing the land use pattern by extending the fallow period to improve the quality or opt for multi-cropping and agroforestry. The tenure security can be obtained by organizing women farmers as a collective/cooperative or federation.

- Women farmers have less access to information, technical knowledge and new technologies and equipment. They need technical training in land degradation, impacts of different land-use patterns, multi-cropping, agroforestry, methods of sustainable agriculture, and the use of modern technology. The communication regarding these matters needs to be more focused on women farmers.

There is no strategy at the central level to involve landless women in agriculture, although such initiatives exist in different states⁴⁷. Landless women mostly work as agricultural wage labourers. Turning wage-labourers into farmers better their chances of income generation and food security and makes a shift in women's role in land management.

4.2.2 Participation in Decision-Making

Women are a major stakeholder in SLEM not only because they are users of ecological resources, but also share the responsibility of environment protection and ecological sustainability. Participation of women in decision-making is critical for their needs, concerns, knowledge, and voices to get reflected in policies and programmes. Under the JFM, IWMP/WDC-PMKSY, FRA and Biodiversity Act, there are provisions for women's representation as members in a village committee. Participation, however, is not only about providing membership to women in Gram Panchayat or village level institutions, but also about facilitating their inclusion by building their capacity and creating the space for them to contribute. The latter aspect is often overlooked in mechanisms created for the implementation of programmes.

For example, women are given 50 per cent of membership in the JFM committees, variously known as Village Forest Protection Committee, Village Forest Committee, and Van Suraksha Samiti. Participation of women both as committee members and as members of the local community depends on the facilitation of their engagement as they face barriers that inhibit their participation. For example, women may not join meetings due to household work or agricultural work, and then there are cultural contexts as women may not participate in meetings where men from family or elderly men are present. Even when women are present in meetings, they may remain silent when men dominate the meetings.

⁴⁷ For example, Sangh Krishi or collective farming is practiced by the landless women in Kerala who take fallow or wasteland on lease, improve the land and soil quality, and cultivate the land. Sangha Krishi started as a poverty alleviation programme of the Government of Kerala in 2007.



4.2.3 Data Gap

Absence of disaggregated data on women beneficiaries of programmes that use units of reporting as household/work undertaken/beneficiary groups makes it difficult to comprehend the number of women who benefit, the social groups to which they belong to, the outcome of women's access to benefits, and the trend in different regions. Secondly, household data, except in cases where women are officially registered as the head of a household, is often misleading as they occupy the unofficial position of the head of a household in situations of migration, disability or death of the male head of the household.

The reporting system of a project is a primary source of data to assess the distribution of resources and sharing of the benefits. Projects often use the household as a unit for reporting, and such reporting does not provide information about how women benefit from the projects unless they belong to women-headed households. Thus, a large number of women beneficiaries who share household agriculture work and use common property resources of grazing land, water bodies, and forests are not counted as

beneficiaries. Secondly, projects that report work/activities undertaken as a unit of reporting do not provide information about the sharing and distribution of benefits across different social groups, even though they include vulnerable socio-economic groups as beneficiaries. For example – MGNREGS uses various deprivation and exclusion criteria to select beneficiaries for asset creation on private land. However, the reporting system of the project captures the work/activity as units but not households affiliated to social groups. Hence, how women from different social groups benefit from the scheme cannot be discerned.

The consequences are two-fold - without any concrete information, knowing how women benefit or not from a policy becomes difficult. Consequently, women are deprived of benefits that can enhance their agency to conserve and manage resources sustainably and arrest ecological degradation. Secondly, the absence of data makes a large number of women who contribute towards sustainable use of resources invisible.

4.3 Tribal Communities and SLEM

Scheduled Tribes constitute 8.6 per cent of the country's population, but they constitute 11.3 per cent of the rural population. The tribal communities living in and around forests have traditionally been dependent on forest resources for household needs – food, fuel, fodder, medicine, and timber for house construction. Forests are also a source of cash income for them. They mainly practise agriculture though some of the members are hunter-gatherers and cattle-herders. They are one of the most vulnerable socio-economic groups characterized by extreme poverty, lack of literacy and ill-health. There are Particularly Vulnerable Tribal Groups among the STs, which are more dependent on natural resources and are even more vulnerable. Tribal regions are also ecologically vulnerable by being water-scarce and drought-prone. It affects agriculture, and a majority of people being small and marginal farmers or landless wage labours, the low yield from agriculture intensifies poverty and malnutrition.

There are three key areas where SLEM policies and programmatic interventions interact with the tribal ecosystem and vice-versa; they can potentially respond to each other positively in enhancing forest-based livelihoods, reducing dependence on forests, and engaging tribal communities in the conservation and management of ecological resources:

- A significant part of the livelihoods of tribal communities is based on the use of a variety of forest resources - fruits, berries, nuts, roots, vegetables and meat for food, grass for fodder, and dry twigs and leaves for fuel. Forests are also a source of cash income as NTFPs, firewood, bamboo and small timber collected from the forests are sold in local markets. The regulations on the access to these resources from forests define the relationship of tribal communities with the state institutions.

While the Indian Forest Act, 1927 primarily concerns regulations, the Van Dhan Yojna and the Minimum



Support Price (MSP) and Development of Value Chain for NTFPs scheme of the MoTA are designed to support people in collecting, storing, packaging and marketing NTFPs. A case study from the field visit is provided in the Box 1 to illustrate how these schemes can be optimized for the NTFP collectors and how that can help people increase their income as well as stop the illegal felling of trees.

- In the context of degradation and depletion of forest resources due to overuse, SLEM requires that the forest-dependent communities' dependence on the forest is reduced. Among the several ways of reducing the dependency, three are significant: promoting agriculture through the improvement of land productivity and augmentation of water availability through water conservation measures, multi-cropping, horticulture, and agroforestry, promoting alternative fuel by introducing alternative energy sources, such as improved cooking stoves, biogas, LPG at a subsidized rate and promoting alternative livelihoods,

entrepreneurial development, off-farm activities, all while strengthening market linkages for forest produce and agri-products.

- Engaging local governance institutions of Gram Sabha and Gram Panchayat in the conservation and management of community resources of land, water, and the forest is the pathway to community engagement in SLEM. Two legislations – FRA 2006 and PESA 1996 – are crucial for the empowerment of local communities to participate in the management of resources that have been their customary domain. While the community forest resource rights are provided to Gram Sabha under the FRA to manage and use community forest resources sustainably, PESA empowers Gram Sabha and Gram Panchayat to make decisions on land acquisition, land transfer, minor water bodies, and granting permission and lease on minor minerals. The slow and inadequate implementation of the two legislations has limited the scope of local governance institutions and tribal communities' engagement in SLEM.

Box 1: MFP trade through institutional support

Livelihood promotion through regularization of access, collection, procurement, and marketing of Minor Forest Produce is undertaken as part of ESIP, under the TRIFED's Van Dhan Yojna. This initiative of the Forest Department of Hoshangabad to regularize the trading of Mahuwa (*Madhuca longifolia*) comprises the following:

- Access to forests for collection of mahuwa in the reserve forest is given from March-April.
- Nets are provided for mahuwa collection. This practice both ensures quality of mahuwa collected as well as prevents forest fire as people used to burn bushes and other growths to clear the ground for mahuwa collection.
- Traditional middlemen/contractors and the informal practice of MFP trading are eliminated by making the registration of the traders mandatory.
- A MoU is signed between the registered traders and MFP cooperatives
- The Forest Department fixes a minimum support price.
- The Forest Department also purchases mahuwa from the cooperatives and auctions the produce. The profit from the auction goes to the cooperatives.
- The traders are to deposit 1% of the profit from sale to the State Biodiversity Board. The amount is to be spent on biodiversity conservation.

This initiative has guaranteed the NTFP rights of tribal communities as well as made it profitable for them thus adding to household incomes and livelihoods. As an example, four NTFP Cooperatives - Chichwani, Dandiwada, Kalaakhar and Kesla (Neelgarh) - in the Sukhtawa Range made a collective profit of Rs. 8,09,130 in 2020. The opportunity for income from NTFP has reduced dependency on the forests and gave people a sense of ownership that has led them to protect the forests.



4.3.1 FRA and Community Forest Resource Rights

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, also known as FRA, 2006, is a landmark legislation in the area of rights of forest-dwelling communities. The Act aims to correct the historical injustices the tribal and other forest dwelling communities were subjected to and establish their traditional rights over forests. The rights include Individual Forest Rights (IFRs) over habitat; Community Rights (CRs) to access and use forest land and associated resources; Community Forest Resource (CFR) rights to use, manage and govern forests within the traditional boundaries of villages; and empowerment of the right holders through the Gram Sabha for the conservation and protection of forests, wildlife and biodiversity, and their natural and cultural heritage.

The CFR rights provided under the FRA recognizes and vests community rights on 'community forest resources', which are defined as "customary common forest land within the traditional or customary boundaries of the village or seasonal use of landscape in the case of pastoral communities, including reserved forests, protected forests and protected areas such as Sanctuaries and National Parks to which the community had traditional access".

The rights include "the right to protect, regenerate or conserve or manage any community forest resource which they have been traditionally protecting and conserving for sustainable use". The right holders and the Gram Sabha are empowered to protect, conserve and manage forests, wildlife and biodiversity.

While the legal recognition of individual forest rights has been put in place, implementation of CFR rights has been lagging. The slow implementation of CFR rights is partly because the demarcation of boundaries of community forests is yet to be completed; there is a delay in approving the pending cases of applications submitted – and partly due to the difficulties the forest-dwelling communities face in filling the application form and submission of the same.

Evidence shows that granting community forest resource rights provides the communities with a sense of ownership and leads to the sustainable use of forest resources. As an illustrative example, a case study of community forest resource management is provided in the box below to illustrate the benefits.

Box 2: Conservation and management of community resource

Pachgaon, a predominantly tribal village in Gondpipri Taluka of Chandrapur district of Maharashtra, illustrates how community forestry can be managed prudently by the poor and forest-based livelihoods can be planned with concerns for ecology and equity. Only a few households of Pachgaon practiced cultivation; remaining households were heavily dependent on wage labour. There was high dependent on forest produce. As earning livelihoods became increasingly difficult, people faced the inevitable fate of migration. It was in this situation that the Gram Sabha of Pachgaon pursued getting community forest rights under the Forest Right Act of 2006. A total forest area of 2486.90 acre of forest land was granted as community forest to the Pachgaon Gram Sabha in 2012.

People together with the Gram Panchayat evolved a community plan to manage and use the forests sustainably for a variety of purposes such as bamboo harvest, fuel, fodder and livestock grazing. Bamboo was harvested by following a rotational method, by dividing the forest area into three zones, and bamboo was cut in each zone once in three years, giving sufficient time for the plantation to grow. The Gram Sabha formed rules and regulations for the management of the community forest.

Bamboo harvesting generated employment for the villagers. The Gram Sabha auctioned bamboo, the wages were paid, and the surplus was invested in the community forest and development of the village. Land adjacent to the village was purchased to make a shed for the storage of NTFPs in three years, the Gram Sabha earned Rs 1 crore from the sale of bamboo and every household on an average earned Rs. 20,000 from the community forest.

Source: Forest Conservation and Management in Pachgaon – <http://www.vikalpsangam.org/article/forest-conservation-and-management-in-pachgaon/>. Accessed on 14.02.2021.



4.3.2 Gaps in the Implementation of PESA, 1996

As an extension of decentralized governance of Panchayati Raj to the Fifth Scheduled Areas, the Panchayat (Extension to Scheduled Areas) Act of 1996 (PESA) intends to empower the Gram Sabha and Gram Panchayat as institutions of self-governance in villages predominantly inhabited by the STs. The areas where PESA vests power in local governance at the community level through the Gram Sabha/ Gram Panchayat are land acquisition, rehabilitation and resettlement, land transfer and safeguards to people's rights on their land, customary rights on common property resources, including MFP, management of minor water bodies and granting of the permit and lease on mining of minor minerals. Besides, every Gram Sabha is also empowered to approve the plans, programmes and projects for social and economic development before such plans, programmes and projects are taken up for implementation by the Panchayat at the village level. PESA thus empowers tribal communities, including tribal women, in the governance of

land, water and forests, the key resources critical to SLEM.

The implementation of PESA is contingent upon the compliance of state subject laws with PESA. Two sets of compliances relevant for SLEM are yet to be completed. They are:

- (i) Compliance of State Panchayati Raj Act with PESA – All States have completed compliance with Section 4 of PESA except Jharkhand and Madhya Pradesh, where compliance is pending on ownership of MFP.
- (ii) An expert committee on Minor Forest Produce constituted in 2010 recommended that MFP ownership be given to the Gram Sabha. Both PESA and FRA contain provisions for Gram Sabha ownership of MFP. Compliance of subject laws related to land acquisition, forest produce, mines and minerals with PESA is yet to be completed in all states. The compliance of important subject laws with PESA is summarized in the table below:

Table 5. Compliance of important subject laws with PESA

States	Land Acquisition	Forest Produce	Mines and Minerals
Andhra Pradesh ⁸⁸	N	N	N
Chhattisgarh	Y	N	Y
Gujarat	Y	Y	Y
Himachal Pradesh	Y	Y	Y
Jharkhand	N	Y ⁸⁹	N
Odisha	N	Y	Y
Maharashtra	Y	Y	Y
Madhya Pradesh	Y	N	Y
Rajasthan	N	N	Y
Telangana	N	N	N

Y = Yes N = No

There are ambiguities in PESA and the subsequent interpretation by the states that have led to divesting/diluting the power of Gram Sabha and Gram Panchayat:

- (i) Areas where PESA provides mandatory consultation and recommendation power to the Gram Sabha or

Panchayat at an appropriate level – all states have vested the stated power related to land acquisition and mines & minerals with the Gram Sabha or Gram Panchayat, except Odisha that has vested the powers with the District Panchayat, Gujarat vested the land

⁸⁸ Govt. of AP has informed that the amendment in subject laws is under consideration.

⁸⁹ Jharkhand Govt. has adopted a resolution on 8.2.2007 conferring ownership right over MFP to Gram Panchayat



- acquisition with the Taluka Panchayat and Telangana with the Block Panchayat. The power given to a Gram Sabha/ Gram Panchayat is thus diluted in Odisha and divested in Gujarat and Telangana. Rajasthan is yet to vest the powers.
- (ii) In the areas of land acquisition, mining of minor minerals and management of minor water bodies – Odisha has vested land acquisition, mines and minerals and minor water bodies with the District Panchayat, Gujarat has vested land acquisition with the Taluka Panchayat, and Telangana with the Block Panchayat. The power given to a Gram Sabha/ Gram Panchayat is thus diluted in Odisha and divested in Gujarat and Telangana.
 - (iii) Areas where PESA provides power to the Gram Sabha and Panchayat at an appropriate level in the area of control over local plans and resources for such plans, including the tribal sub-plan (information is available for five States – AP, Gujarat, HP, Odisha, Rajasthan) – while Gujarat and HP have vested the power with the Taluka Panchayat and Panchayat Samiti, respectively, divesting the power of Gram Sabha/ Gram Panchayat, Odisha has vested it with all three tiers, thus diluting the power of the Gram Sabha/ Gram Panchayat.
 - (iv) In planning and managing minor water bodies where PESA vests the power with the Panchayat at the appropriate level – seven states have vested the power either with the Gram Sabha or with the Gram Panchayat. Jharkhand and Odisha have vested the power with the District Panchayat.

A committee for harmonizing state laws with PESA was set up in 2014 under the chairmanship of the Union Law Secretary. The committee gave several recommendations mainly to strengthen the central PESA, i.e. Gram Sabha/ Panchayat is to be consulted prior to land acquisition for development projects, diversion of forests land and Gram Sabha/ Panchayat is to recommend the licensing of minor mineral. Only the Ministry of Coal and the Ministry of Tribal Affairs have agreed to undertake the necessary changes recommended by the committee.

At the level of community, the realization of PESA depends on people's awareness about the provisions and assertion of rights provided under PESA. Given the high level of poverty and the low level of literacy among tribal communities, the intended objectives of PESA are yet to be met.

4.4

Challenges to Community Participation in Conservation and Management of Biodiversity

The Biological Diversity Act of 2002 extends the concept and practice of community participation to the arena of biodiversity conservation and maintenance. The Act is significant from people's perspective because it provides the control and ownership of bioresources and local traditional knowledge, and it gives local communities the mandate of conservation, management and documentation of local bioresources.

The Act prescribes for the constitution of the Biodiversity Management Committee (BMC) as a village institution at the level of local governance, i.e. the Gram Sabha and Gram Panchayat in rural areas, which would include 1/3rd women members and 18% from STs or SCs. The committee will have a Local Biodiversity Fund, constituted

of loans or grants made by the National Biodiversity Authority (NBA) and the State Biodiversity Board (SBB) and any fund generated by the BMC through levying of fees. The fund will be used for biodiversity conservation of the local area that comes under the jurisdiction of the BMC.

As per the Biological Diversity Rules, 2004, "the main function of the BMC is to prepare People's Biodiversity Register (PBR) in consultation with local people. The register shall contain comprehensive information on the availability and knowledge of local biological resources, their medicinal or any other use or any other traditional knowledge associated with them. And that "the People's Biodiversity Registers shall be maintained and validated by the Biodiversity Management Committee. The document should



be endorsed by the BMC and later publicized in the Gram Sabha/ Gram Panchayat/ Panchayat Samiti." As per the 2004 Rules, the People's Biodiversity Register will be prepared by the BMC with technical support from a Technical Support Group (TSG)⁵¹. "The Committee shall also maintain a register giving information about the details of the access to biological resources and traditional knowledge granted, details of the collection fee imposed, and details of the benefits derived and the mode of their sharing"⁵². Additionally, the BMCs are to ensure conservation and management of biological resources and protect the traditional knowledge associated with local biodiversity.

Apart from recognizing traditional rights, the FRA 2006 empowers a forest right holder to take responsibility for biodiversity conservation and management of the forest. Implementing this provision has not been in the forefront as the FRA is generally seen as an Act providing rights over forest land.

However, in general, there are challenges in eliciting community participation in local biodiversity conservation and management. They are as follows:

- (i) Despite the two central legislations, the progress of engaging people in biodiversity conservation and management has been slow and uneven across the states. Both the formation of the BMC and the preparation of the PBR have lagged⁵³.

- (ii) The TSGs are to build the capacity of the BMCs and local communities and engage them in the preparation of PBRs. Given that the progress has been slow and care should be taken that the local community institutions are not bypassed, and community engagement is not compressed. In such a context, monitoring mechanisms at the Block/ District, including people's audit of the process, will be helpful to track the process and ensure accountability.
- (iii) The FRA 2006 has the provision for the formation of a committee for biodiversity conservation and management. As per the 2012 rules, the Gram Sabha is empowered to constitute, monitor and control the committee "which shall prepare a conservation and management plan for community forest resources to sustainably and equitably manage such community forest resources for the benefit of forest-dwelling Scheduled Tribes and other Traditional Forest Dwellers and integrate such conservation and management plan with the micro plans or working plans or management plans of the forest department with modifications as may be considered necessary by the committee". The scope for synergy between the two legislations in terms of activities to be undertaken by local communities through village committees and their mutual sharing of information as well as joint planning is missing.

4.5

Common Property Resources

Common property resources (CPRs) in rural areas include village water bodies, such as ponds/lakes/rivers/rivulets and their banks and beds, community forests, community pastures, wastelands, common dumping and threshing grounds, and watershed drainages. Rural communities, especially small and marginal farmers, landless, pastoralists and women, depend on local CPRs for fuel, fodder, water, and livestock grazing. CPRs provide livelihood support to a large majority of the rural population in India (Pradhan *et al.*, 2011).

Traditional agrarian economy supported CPRs as a source of livelihood diversification for the poor. With irrigation and the use of modern technology, CPRs have lost some of their traditional value. In rainfed/arid areas, however, CPRs constitute an important resource for rural communities. Over time, loss of CPRs has occurred due to encroachment and diversion of land for building infrastructures and industries. Besides, CPRs also get depleted due to overuse by people themselves. Since CPRs are critical for both livelihoods and maintenance of biodiversity, the need for

⁵¹ Guidelines for Operationalization of Biodiversity Management Committee (BMC), 2013 National Biodiversity Authority, Government of India.

⁵² *Ibid*

⁵³ Following a letter from the National Green Tribunal (NGT) in August 2019 the processes have been accelerated but not yet completed except in some states.



effective governance of village commons, including land tenure and institutional design, was emphasized in the Twelfth Five Year Plan.

Several policies related to enhancement, management and conservation of natural resources include village CPRs in their scope and action. For example - MGNREGS prescribes the regeneration of village commons through plantation and land measures as well as the creation of natural-resource based assets such as ponds and the development of fisheries on public land. The IWMP covers the development and conservation of common resources of land and water, including pastureland development. Under agroforestry, plantations can be done on barren community land, panchayat land and non-forest land. JFM has been extended to include village commons. Besides, in some instances, compensatory afforestation of CAMPA too takes up plantation on village commons.

Although the development of CPRs is included in the policies, the lack of a comprehensive approach towards them has resulted in each policy or programme carrying out its mandate as per its design and scope.

There are gaps in information regarding the nature and extent of rural communities' dependence on CPRs as well as the impact of their loss due to diversion from development projects and the impact of changing land-use patterns on CPRs.

In managing CPRs, programmatic interventions need to pay attention to the issues that are associated with the development of village commons:

- Although legalities and common practice prescribe that the grazing land be used only for plantation of

grass and trees that will be used as fodder, grazing land is sometimes used for planting species that can have other value but cannot be used for fodder.

- Planting commercial trees on village commons land helps Panchayat sell them to generate revenue, but it should be ensured that the returns should also benefit the rural poor. Strong institutional mechanisms are also required to avoid the fate of "tragedy of commons".
- CPRs are an important source of fuel and meet the energy requirement of rural households. How CPRs are accessed, how biomass is distributed, and what priorities are accorded to different households and social groups are important aspects of programmatic interventions that aim to develop CPRs.
- When grazing land is closed for development and alternate arrangements are not made, they give rise to conflicts, adversely affecting livelihoods and incomes.
- Since village communities are not homogenous and are placed in hierarchies of power, conflicts over access to CPRs are not uncommon. Often balancing competing demands for resources to meet personal needs vs common needs among the community members is the cause of conflict, and if common meeting grounds are not found and respected, the resource is subjected to uncontrolled exploitation without the community caring for its sustainability. Therefore, participatory planning, integration of traditional management practices and institutionalizing procedures in the interest of addressing conflict resolution should not be ignored.

4.6

Incorporation of Traditional Community-based Systems

A sustainable development framework emphasizes the revival and sustenance of traditional /indigenous practices of natural resource use and management. It is, therefore, a policy imperative both internationally and nationally to incorporate such practices in policies and programmes.

Traditional community-based Natural Resource Management is included in some schemes – MGNREGS and IWMP aim to revive and create traditional water harvesting systems, and the FRA emphasizes traditional management of forests by the forest-dwelling communities.



Integrating traditional systems are useful for several reasons as they have proved to be successful in managing the resources wherever there is already a practice of collective management and sharing of benefits. Since it has been in practice for a long time, its social acceptability and ownership is higher and traditional knowledge is usually low cost. All these make traditional systems more acceptable, ecologically sound, and financially viable in the context where they are found useful. A case study of one such practice is provided in the box below as illustrative of the benefits of traditional community-based systems.

However, it is important to note that traditional local systems are not alternative to modern/scientific systems of

land management. Many of these traditional methods may not be the most optimal or scalable option, especially if faced with problems of gigantic proportions where the degradation of natural resources is already near the tipping point. Also, many of these traditional methods themselves are not codified or standardized, making substantial variations possible when implemented. However, the existences of traditional practices imply that people adapt to such a situation by using their knowledge, skills, and ability to innovate. Documentation of such practices and their promotion in cultures and regions where they exist can be valuable for SLEM.

Box 3: Revival of traditional water conservation systems

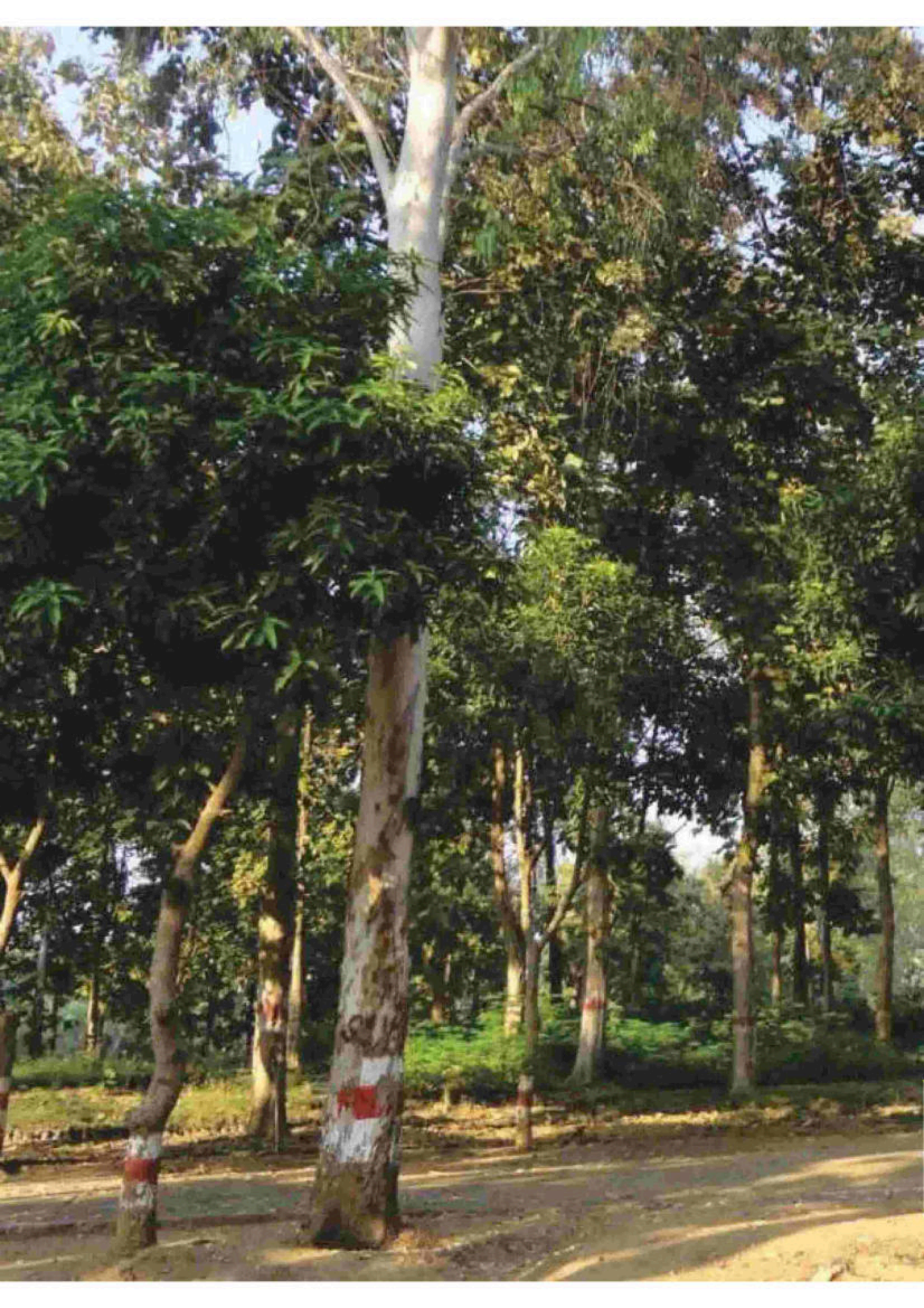
Johad is a traditional rainwater harvesting practice in Rajasthan. Johads are a system of earthen check dams that arrest runoff leading to improvement in percolation and groundwater recharge. The water collected in a johad during the monsoon is used for irrigation, drinking and other domestic purposes. Johads improve the soil moisture in the fields and can help in cultivating a second crop in winter.

Tarun Bharat Sangh (TBS), a grassroots organization based in Thanagazi block of Alwar district, began reviving the traditional practices of johad with community support. It began its work in Gopalpura village in 1985, and in 25 years it built close to 10,000 water harvesting structures across 1,000 villages spread over 15 districts in Rajasthan. The TBS has constructed Johads on agricultural land as well as on village common land (gochar). They have been constructed by using locally available resources. The cost of construction is shared by people who benefit from johads.

Jal Samiti (water committee) and Jal Sabha (water assembly) are two community-based collectives constituted by the TBS to help in planning, constructing and maintaining johads. They are also responsible for including the land belonging to all social groups while planning johads. Johads constructed by the TBS have resulted in an increase in ground water level, they have resulted in sustained increase in crops, increase in household income from agriculture and animal husbandry, and have substantially reduced migration to other regions for work.

Revival of the traditional practice of johad has led to its inclusion in programmes like MGNREGS.

Source: Sinha, J., Sinha, M.K. and Adapa, U. 2013. Flow-River Rejuvenation in India: Impact of Tarun Bharat Sangh's Work. SIDA: Stockholm; Sisodia, M. 2009. Restoring Hope to a Barren Land: 25 Years of Evolution.



CHAPTER 5



Key Institutions and Mechanisms to Implement SLEM



5.1 Role of Institutions in Implementing SLEM

While the drivers of degradation of land and ecosystems remain what they are, the institutional responses to the challenges can influence the outcomes immensely.

There are two categories of institutions that can be looked at when the management of natural resources, a public good, is concerned. While the first is the public institutions that provide funds, formulate policies, draw rules, and implement them, the other is the various forms of community organizations, both formal such as the gram panchayats and informal, which play an equally important role when access, distribution and use of such natural resources are concerned.

Within the set of public institutions, there are various institutions at the Central, State, District, Sub District, Gram Panchayat and Village level, which are mandated with land governance, some of which are specific to Acts and sector programmes.

Apart from MoEFCC, the primary institution responsible for coordinating SLEM and LDN under the UNCCD, no other ministry or government department is directly charged with this responsibility. There are other central ministries, which deal with land and are therefore direct and indirect stakeholders, primarily on account of implementing programmes on land or using land resources to implement their mandate. Water and biodiversity are inextricably linked to land, and thus these ministries are stakeholders in SLEM. In addition, there are research institutions under the Centre that work in the areas related to SLEM.

Under the state government, line departments implement programmes that have a bearing on SLEM, which in turn frame the state-level policies and implement programmes. There are also state-level institutions such as state remote sensing agencies, State Institute of Rural Development (SIRD), and agricultural universities that play an important role in implementing SLEM approaches.

5.1.1 Institutions Connected with Land and Ecosystem Management at the Centre

Various ministries at the Centre play an important role in combating land degradation and desertification.

Land falls under the State List in the Seventh Schedule of the Constitution, while land acquisition is on the Concurrent List. However, the Government of India, through its different ministries and departments, has assumed an important role by implementing overarching policies and programmes influencing land use in the country. These policies have a variable extent of influence on sustainable land use. The relevant ministries have been classified

based on the extent to which policies administered by them influence sustainable land-use practices in the country.

Ministries/ departments set policies and regulations and also commit resources for the implementation of their mandate. The subject elements in their policies and programmes are determinants of their impact on SLEM. The activities of key ministries/departments with respect to their relevance to SLEM are presented here to facilitate a better understanding of their roles in land and ecosystem management.

Table 6. Role of central ministries/ departments in SLEM

S. No.	Ministry/ Department	Contribution towards SLEM
1	Ministry of Environment, Forest and Climate Change	Conservation and survey of flora, fauna, forests and wildlife, prevention and control of pollution, afforestation and regeneration of degraded areas, protection of the environment and ensuring the welfare of animals Plays a central role in initiating discussions and setting the framework for bringing in the ecosystem approach into land management (rather than looking at land as an individual resource), developing methods to monitor biodiversity and mapping national-level indicators on forest and tree cover



2	Department of Agriculture, MoAFW	Development and implementation of policies and programmes on agriculture, which also define sustainable land use; extension of SLEM practices in agriculture; drought management; development of planting material that stands drought, and for optimizing production in various types of lands, including marginal land, and reducing the overuse of chemical inputs in agriculture
3	Department of Animal Husbandary and Dairying	Improvement in quality of dairy resources, promoting stall feeding absence of which is one of the key drivers of land degradation due to unsustainable grazing, optimization of cattle resources keeping in view livelihoods needs and availability of resources as part of integrated farming systems and fodder development
4	Department of Agricultural Research and Education, MoAFW	Management of the networks of research institutions mandated with research and development in the agriculture sector, including technologies for sustainable land and drought management; capacity development in these subject areas; development of sound management practices based on science, data, and empirical observations; thematic mapping of land, which includes drainage, soil type and soil health, watershed boundaries and cropping patterns for improving baselines and monitoring methods
5	Department of Water Resources, River Development and Ganga Rejuvenation (Ministry of Jal Shakti)	Management of the networks of research institutions mandated with research and development in the agriculture sector, including technologies for sustainable land and drought management; capacity development in these subject areas; development of sound management practices based on science, data, and empirical observations; thematic mapping of land, which includes drainage, soil type and soil health, watershed boundaries and cropping patterns for improving baselines and monitoring methods
6	Department of Rural Development	Financing and coordinating the activities related to the development of rural infrastructure, non-farm livelihoods and rural employment All activities supported by the department have a bearing on sustainable land management.
7	Department of Land Resources	Implementation of key programmes related to watershed management Plays a key role in coordinating actions related to restoration of land, development of economic models to facilitate investments, capacity building of Panchayati Raj Institutions and other community-level institutions (which implement watershed programmes), bringing science and technology-based interventions for land management, demonstrating pilots and successful models and developing a repository of data for long term monitoring of land degradation
8	Department of Fisheries	Development of inland fisheries, which have a significant impact on land management, dovetailing fishery-related activities with activities taken up for water conservation and conservation of local species of fishes
9	Ministry of Panchayati Raj	Strengthening the capacities of Panchayati Raj Institutions for effective participatory planning, monitoring and implementing government programmes, access and control of natural resources and their conservation Implementing the integrated GPDP process and ensuring equity to vulnerable and disempowered sections of the society
10	Ministry of Mines/Coal/ Steel	Development of safeguards for the protection of the environment during mining, guidelines for mine closure, reclamation of mined-out areas, curbing unscientific illegal mining operations, a sustainable development framework for mines, framework and guidelines for pricing in the environmental cost of mining in a judicious manner and disposal of process waste and effluents
11	Ministry of Road Transport and Highways	Development and maintenance of highway infrastructure, road alignments, road design, and alignment impact the flow of ecosystem services on land; green corridors along road infrastructure are important contributors to LDN and NDC targets



S. No.	Ministry/ Department	Contribution towards SLEM
12	Central Pollution Control Board (CPCB)	Watchdog for pollution control at the National level has a key role in the implementation of projects related to waste management, contaminated sites, industrial pollution, urban pollution, infrastructure development and environment training, setting science-based standards and protocols, maintaining laboratories and taking legal action against defaulting companies
13	Department of Commerce (Plantation Division)	Policies and regulations related to key plantation crops such as tea, coffee, spices, and rubber, cultivation practices of these commodities have a bearing on sustainable land management in the plantation areas
14	Ministry of Tribal Affairs	Development and support to the tribal institutions for sustainable use of natural resources and documentation of indigenous knowledge and practices
15	National Biodiversity Authority	Implementation of the provisions of the BD Act related to access benefit sharing and sustainable use of bioresources; supporting the development of People's Biodiversity Register and capacity development of village-level Biodiversity Management Committees
16	Ministry of Power	Disposal of waste in a manner to cause least impact on land quality and development of green electricity
17	Department of Space/ ISRO/ SAC/ NRSC	Mapping of land use, land-use changes and degradation, defining and developing methods to identify and classify various stages of land degradation, GIS and RS-based scientific tools for developing project plans to restore degraded land and subsequent monitoring
18	Department of Science and Technology	Support research in subjects related to sustainable land management, especially related to technologies for physical and chemical management of land, control of pollution, treatment of waste, use of resources in a manner that generates less waste and extension of research from the lab to field
19	Ministry of New and Renewable Energy	Development and promotion of bio-mass related energy sources for rural areas, which reduces unsustainable extraction of firewood from forests and non-forest areas
20	Department of School Education and Literacy	Addresses the issue of land pollution, conservation of ecosystems and inter-generational equity, among other relevant concepts in the school curriculum
21	NITI Aayog	Overall country-level strategy, coordination between sectors and harmonization of policies and regulations

5.1.2

Institutions Connected with Research, Survey, Assessment and Technical Support for SLEM

There are a number of institutions providing support for SLEM through technical inputs in the assessment of land resources, biodiversity, development of technologies and

their know-how, training and capacity building, field testing and extension. Some key institutions and their role have been summarized below:

Table 7. Institutions connected with survey, assessment and technology related to SLEM

S. No.	Name of Institution	Role in context of SLEM
1	Central Ground Water Board (CGWB)	Sustainable assessment of groundwater and development of policies for groundwater use
2	Department of School Education and Literacy	Addresses the issue of land pollution, conservation of ecosystems and inter-generational equity, among other relevant concepts in the school curriculum

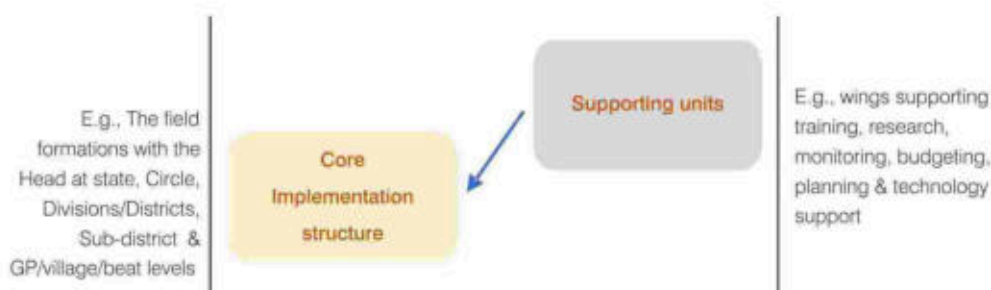


3	Central Water Commission	Responsibilities of initiating, coordinating and furthering in consultation of the State Governments concerned, schemes for control, conservation and utilization of water resources throughout the country
4	Central Pollution Control Board	The regulatory body for pollution control at the national level
6	ICAR institutions	Research in agriculture, grasslands, agroforestry, land use survey and planning,
7	ICFRE Institutions	Research and education in the forestry sector
8	Space Applications Centre (SAC)	Application of space technology for land use monitoring and assessment
9	National Remote Sensing Centre (NRSC)	Satellite data and Bhuvan-based monitoring portal
10	Indian Meteorological Department (IMD)	Weather data and forecasting
11	Indian Institute of Forest Management (IIFM)	Education in forest and natural resources management
12	Wildlife Institute of India (WII)	Wildlife research
13	Indian Plywood Industries Research and Training Institute (IPIRTI)	Centre of Excellence for wood-based industries
14	National Institute on Rural Development and Panchayati Raj (NIRD&PR)	Training and capacity building in Rural Development and Panchayati Raj sector

5.1.3 Institutions Connected with Land and Ecosystem Management at the State level

Institutions at the Centre are more policy-oriented and focus on devolution of funds for major schemes, whereas the state government institutions are more implementation focused. There are four key departments in the states and institutions under them, which are fundamentally related to SLEM, namely Forest, Agriculture, Rural Development, and Panchayat Department. The other departments, such as

the Revenue, Water Resources/ Irrigation and Mining, also contribute significantly towards sustainable land management, but their role in program implementation is limited compared to the other four departments. Usually, each of these four major departments are organized as core implementation units and other supporting units as under:



All land-based departments (Forests, Agriculture, Rural Development) have their lowest management unit responsible for a particular territorial jurisdiction, i.e. forest beat, block or sub-block, Gram Panchayat/ village level.

Essentially all the directions and orders from the department related to any wing would eventually reach that level for implementation. While the tasks related to various verticals of the department at the state level is dealt with by



people with higher capabilities, training and education, which reflects the required level of experience, domain knowledge, understanding of policy environment and purpose of programmes, at the lowest level the tasks and subjects are assigned to staff whose capacity may not always match the requirements of a programme. This dichotomy presents one of the key implementation bottlenecks in the delivery systems of public institutions.

Some of the schemes and programmes of the government, while realizing this challenge, have incorporated dedicated institutions at the ground level for implementation, for example, the Watershed Development Team under watershed programmes. However, this area remains a concern in effective programme implementation, especially where community mobilization or behaviour change is required.

5.2

Institutional Challenges Related to the Implementation of SLEM

There are well laid out institutions at the Central, State, District, Block, and Gram Panchayat levels to implement policies and programmes initiated by the Centre and state governments. Though there are various programmes that have elements of SLEM built in them, there is no programme that entirely focuses on SLEM at a landscape level. Activities related to SLEM are multi-disciplinary, covering areas such as management, policy, technology,

legal, governance, as well as multi-sectoral, covering sectors such as forestry, agriculture, skilling and livelihoods and local institutions. It calls for closer coordination with respect to planning, implementation and monitoring between various agencies. Thus, the institutional layout and responses play an important role in the success and failure of the combined effect of the various programmes cumulatively addressing the challenges of SLEM.

5.2.1 Broad Observations on the Institutional Structure

As respective responsibilities often flow across various agencies and departments, the following challenges

emerge while analyzing the institutional arrangements in the implementation of SLEM projects.

1. There is no institution at the state level that looks at land management in totality.
2. The district collector/ district magistrate (DC/ DM) has been the fulcrum of all government programs and is the focal person around whom the interdepartmental coordination and planning revolves. The DC/ DM has to prioritize his attention. An institution at the next level to support the DC/ DM is required to increase the effectiveness of his office.
3. At the district and block level, the staff is mostly implementation focused. Often, district officials miss the holistic view of the sector beyond the targets they need to achieve. District level coordination as such become difficult.
4. Some central sector schemes have set up district level units as part of scheme implementation with a few dedicated staff, but they are insufficient for proper technical handholding and supervision.
5. Same functionary has to implement the functional aspect of the sub-areas when it comes to the block level or below. The intensity of concerns and the subsequent actions required to address the issue gets diluted as it reaches the ground levels.
6. Staff strength at GP level is limited compared to the responsibilities and involvement of the GPs envisaged in most programs. The planning and managerial capabilities of staff that are there are limited. There is hardly or no reporting relationship of line department with panchayats, so the panchayats are mostly not aware of the plans of individual departments.
7. Involving Gram Sabha in the ownership of government programs has remained a challenge. Social mobilization has faced many obstructions due to the social and political setup, lack of transparency and general apathy.
8. The non-separation of executive and governance functions at the GP level has reduced GPs as an executing arm of the government machinery, creating issues wherever governance interference is required.



5.2.2 Central Level and State Level

The primary role of the central institutions is laying out the policy landscape, developing relevant schemes and programmes, funding and monitoring. The institutions at this level are backed by legislations and have the power to make regulations to control the use of natural resources. The bottlenecks at this level have been identified as follows:

- Although the people manning the senior administration are of have high competence, technical expertise in support teams is sometimes a gap, which is sometimes filled by project-related short-term staff. However, this arrangement is not institutionalized.
- Interdepartmental coordination and agreement on common goals remain a challenge as the Departments are committed to their core mandate.

- Absence of good quality data impedes evidence-based planning.

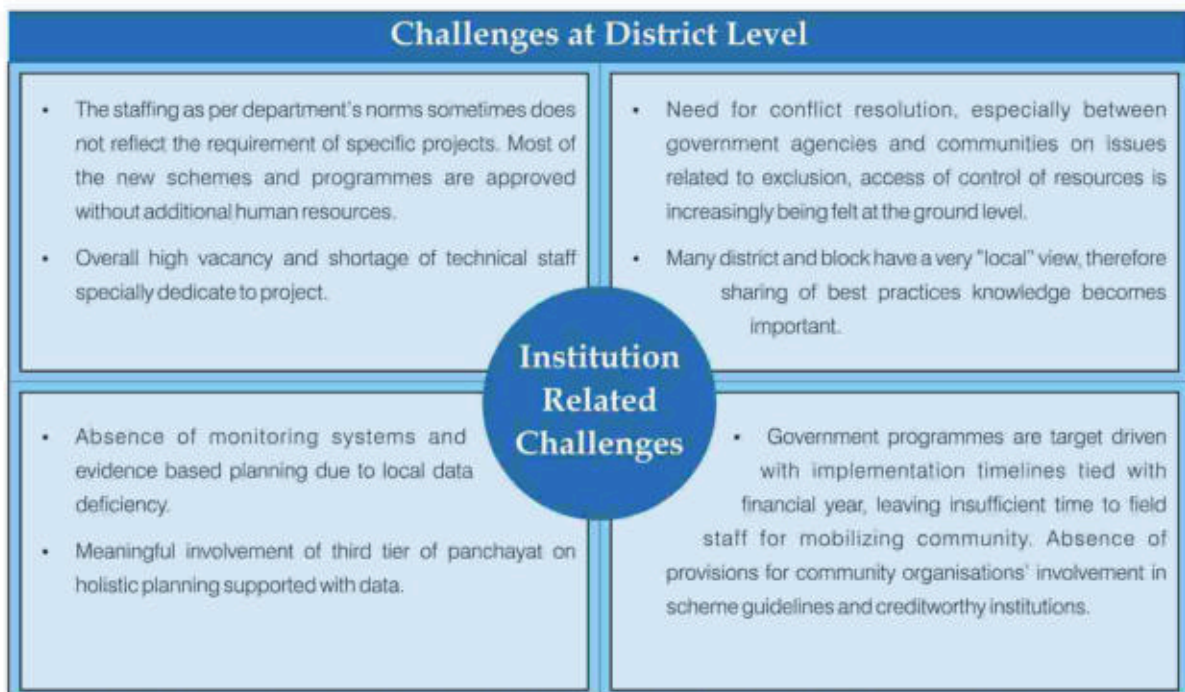
The challenges faced by the state-level institutions are similar. In addition, challenges faced by state-level institutions include:

- The institutions face difficulty creating and upgrading staff capacities due to large vacancies, low participation in training programmes, absence of capacity enhancement tools, resistance to behaviour change, and low incentives for capacity building.

The general capacity of the institutions to enforce regulations, especially related to natural resources management, pollution, access and control of resources, is limited.

5.2.3 District Level and Block Level

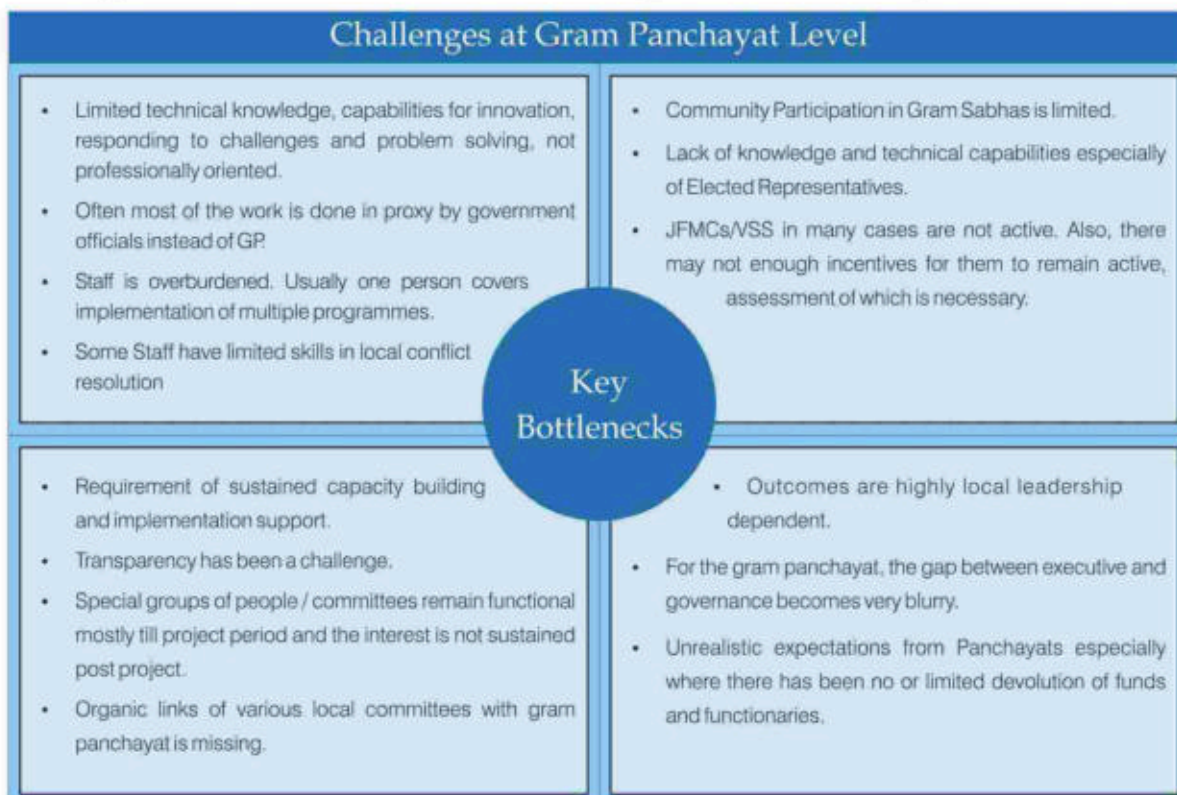
The important institution related challenges encountered at the district level have been summarized below:





5.2.4 Gram Panchayat Level

The challenges at the GP level are the most critical, essentially because most of the schemes vest the panchayat with the responsibility for participatory planning, implementation and monitoring.



5.3 Institutions at the Implementation Level

Local institutions play a crucial role in the development of a village or an area. The role of the institutions in the development process is defined by the power and authority provided to them by law as well as the social influence they exercise in the area. These institutions can be differentiated into:

- Local government institutions
- Local community organizations
- NGO/Private or market-based organizations

Local Governance Institutions: Of the 29 functions devolved to the panchayats, 12 functions directly relate to SLEM-agriculture, including agricultural extension, land improvement, implementation of land reforms and land consolidation and soil conservation, minor irrigation, water

management and watershed development, fisheries, social forestry and farm forestry, minor forest produce, drinking water, fuel and fodder, roads, culverts, bridges, ferries and waterways, non-conventional energy sources, poverty alleviation programmes and maintenance of community assets. This makes the role of local institutions significant in the implementation of SLEM.

The extent of decentralization in respect of PRI varies across states. Kerala, Tamil Nadu, Karnataka and West Bengal have performed better in terms of devolution compared to other states.

PRI's scope and capacity remain limited due to the lack of devolution of function, functionaries and funds. Besides, Gram Panchayats as an institution are saddled with weak



technical capacity, financial resources, administrative capacity, decision-making power and low transparency and accountability. Limited funds from their sources have restricted them to build capacity on their own.

The social dynamics of villages also affect Gram Panchayats, making them partisan and undemocratic in situations where institutional checks and balances are absent.

However, comprehensive planning has only recently begun at the gram panchayat level through the GPDP. Since the GPs can only implement small scale projects within their jurisdiction, implementation of medium and

large programmes must be undertaken by block and district panchayats, respectively. Following the allocation of funds by the Fifteenth Finance Commission to the block and district panchayats, there is a scope for these institutions to implement programmes.

Implementation of PESA has also been slow and lacks uniformity across the ten states in operation. While compliance of the state Panchayati Raj Acts with Section 4 of PESA has been completed in most states, only two states have completed compliance with the state subject laws with PESA.

5.3.1 District Panchayat

There are multiple institutions at the district level, i.e. DRDA/ Zila Panchayat, District Planning Committee (DPC), District Planning Unit and line departments. The DPCs were envisaged to be the central institutions for district planning. Even though the DPCs are constituted, comprehensive planning at the district level is yet to be achieved in this forum. The DPCs in many states are also dormant.

District planning is largely sectoral. Since SLEM also involves multi-sectoral planning, thematic integration across departments and programmes is very important. Sharing data and technical knowledge with district panchayats is required to enable them to identify district-

specific issues and plan interventions either through the existing programmes or by planning a new project.

Another major gap at the district level is the lack of technical expertise to analytical review/evaluate the programme /policy outcomes. It is different from the periodic review of programme performance. Analytical reviews are important to understand the contextual factors and trends and how the interventions under any programme have met the policy objective. In the absence of such a review, programmes often end up treating symptoms rather than addressing the root causes.

5.3.2 Block Panchayat

As the intermediary level of decentralized governance, the Block Panchayat is an institution of considerable significance. This level is also the cutting edge as far as implementing and collecting field level information is concerned. Gram panchayat plans get consolidated and approved at Block Panchayats, and the reports are also aggregated at the Block level. Most of the line departments have aligned their organizational structure as per the blocks' boundaries bringing ease in coordination. Coordinating

among various departments and drawing synergies across various programmes are important at this level.

Besides block level offices being the frontline governance units, people come in regular contact with these units and therefore serve as an important source of information for the rural population about the policies and programmes and thus work as a communication channel between the district and the village.

5.3.3 Gram Panchayat

The institutions at the panchayat level are:

- Gram panchayat as the executive body of elected representatives

- Gram Sabha, an assembly of all adult residents living in a panchayat
- Sub-committees and standing committees of the panchayat dealing with various sectors



The GDPD process and Mission Antyodaya has enabled panchayats to make long-term perspective plans and annual operational plans. However, capacity issues, including trained and experienced subject matter resources, remain the critical bottleneck. Besides training office bearers and elected representatives, the panchayats need technical support to perform their tasks. The MoPR supports states in the capacity development of PRIs through the Rashtriya Gram Swaraj Abhiyan. However, the uptake of funds has been a challenge, with most states not

being able to utilize funds. There is also a challenge of overcoming the lack of interest of elected representatives in participating in the training programmes.

Panchayats have also not been able to raise their revenue for various reasons, such as inadequate coverage of taxable properties, lack of modernization of the taxation system, panchayats being powerless against certain defaulters, and PRIs' lack of administrative skills. It limits their ability to plug in the administrative and technical capacity on their own.

5.3.4 Standing Committees at Panchayats

PRI Acts in different states have provisions for the constitution of standing committees for all three tiers of PRIs. However, the mandatory number and nomenclature of these committees vary across states. These committees cover all subjects entrusted to PRIs such as agriculture, sanitation, communication, public health and education. The standing committee comprises elected representatives of panchayats and other members who are interested in public welfare. The panchayats nominate them.

Standing committees are important institutions within the panchayats as they deal in a more focused manner with various subject areas within its domain. Their role is

valuable as they are the only institutionally mandated body to deliberate on actions required in respective areas.

A standing committee addressing the critical issues in forest/land degradation and land management does not exist as a matter of rule in panchayats across the country. Panchayats have usually fallen short of preventing encroachment in both the common or forest land and village water bodies. A standing committee on forests/land degradation can play a crucial role in addressing the issues of land degradation, soil and moisture conservation, watershed development, encroachment, illegal extraction of bioresources, among others.

5.3.5 Self-Help Groups

SHGs are mostly engaged in thrift and credit operations. SHGs have also provided platforms to discuss social issues. Many government programmes and schemes for rural development are harnessing SHGs to facilitate community participation. They have also got institutionalized in programmes related to eco-conservation such as Joint Forest Management, ecodevelopment and watershed development.

However, SHGs, like most groups, face institutional stagnation after a certain point, and their effectiveness decreases due to age-related issues (beyond five years of

their operations). It is important to address age-related challenges through context-specific and tailored training programmes to sustain such groups.

Engagement of SHGs in NRM-based activities is limited. It is crucial to engage SHGs in land-based activities where the groups can share economic benefits through community management of grazing land and usufruct sharing from MFP. Through SHGs, the active participation of women can be strengthened to boost programme implementation.

5.3.6 Users Groups

Users groups are often formed in villages to sustainably managing the use of a particular resource or service. Examples are water users' groups in watershed project areas. Another example is user groups being revitalized or formed for construction, repair or upgrading structures

such anicut, check dams and ponds. The sustainability of user groups formed as part of a project has been a big challenge. Attempts to address this issue have been taken up in many multilateral-funded projects as well.



5.3.7 Joint Forest Management Committees

Joint Forest Management Committees (JFMCs) are formed in villages having forests by the state forest department to protect and manage nearby forests. Locally prepared byelaws and micro plans guide the JFMC activities. The JFM communities are responsible for protecting and managing the designated forests in return of benefits sharing from NTFPs, intermediate harvest of timber, and other intangible benefits from local forest ecosystem services. As of 2011, there were 1.18 lakh JFM committees covering 1.45 crore families managing 22.9 Mha of forest land⁵⁵.

JFMCs/ VSS were active in different states across the country in the 1990s and 2000s. However, due to project

closure and reduction in support from the mainstream forestry programmes, most JFMCs are now non-functional⁵⁶. JFMCs can be revived and be the vehicle for mainstreaming SLEM approaches in projects and schemes across the country. The existing knowledge and skills in the villages can be harnessed to promote sustainable harvesting possible here.

The primary challenge faced by JFMCs in sustainability is the meagre returns from forest usufructs and operations, which has diminished their incentives to remain active.

5.3.8 Ecodevelopment Committees

Ecodevelopment Committees (EDCs) are similar to the JFMCs but meant for villages in Protected Areas (PAs) and their buffer zones. EDCs have now been an integral part of the wildlife management strategy throughout the country. They focus on addressing the twin objective of protecting wildlife and biodiversity and undertaking eco-development activities in the villages.

EDCs have been successful in some large PAs, but the success across the conservation spectrum has not been uniform. Tying up livelihood opportunities around PAs has been one of the main themes of EDCs as usufruct sharing cannot be permitted from PAs. The challenges around the sustainability of the institution beyond the project period have been similar to the situations of the JFMCs.

5.3.9 Biodiversity Management Committees

Every local body has to create a Biodiversity Management Committees (BMCs) within its area as per the Biological Diversity Act, 2002. The main functions of the BMC are to prepare the People's Biodiversity Register (PBR) in consultation with local people and take the initiative to generate awareness regarding biological resources available in the locality. There are 2,68,639 BMCs in the

states and 4,812 in Union territories⁵⁸. Around 2,28,543 PBRs⁵⁷ are being prepared.

BMCs can contribute significantly to mainstreaming SLEM approaches in villages, especially in identifying and conserving economically valuable bioresources. They also have a vital role in the conservation of ecosystems. BMCs have been recently aligned with PRI institutions to mainstream them.

5.3.10 Voluntary Organizations, NGOs and Corporate Foundations

Voluntary Organizations/ Non Governmental Organizations (VOs/ NGOs) play an important link between government institutions and the community by providing support in

service delivery, community mobilization, awareness creation, maintaining oversight, training and capacity building and behaviour change.

⁵⁵ JFM Committees and Forest Area (frienvs.nic.in)

⁵⁶ http://www.frienvs.nic.in/Database/Joint-Forest-Management_1949.aspx

⁵⁷ Source: <http://nbaindia.org/content/20/35/1/bmc.html>

⁵⁸ *ibid*



The formalization of the partnership between the government and NGOs took place in the mid-1980s. In its Seventh Five Year Plan (1985-1990) document, the Planning Commission added a section titled "Involvement of Voluntary Agencies" in the chapter on Rural Development and Poverty Alleviation Programmes. The Council for Advancements of People's Action and Rural Technology (CAPART) was formed in 1985 to channel funds and support NGOs.

The VO/ NGO ecosystem has developed tremendously since, and so has their capacity to take up complex issues and enable change on the ground. They have also mainstreamed some of their techniques into government programmes such as PRAs and social audits. Certain

government programmes have also made space for VO/ NGOs as implementation partners in government schemes, for example, IWMP as the Project Implementing Agency and MGNREGS for capacity building and supporting social audits.

Such organizations usually have deep-rooted relationships with the local community where they have worked for a long time. It helps them gain trust and thus influence the community, something which government organizations or bureaucracy find difficult to build because of the lack of perspective and skills.

In the context of SLEM, the following is a list of areas where the support of VO/ NGOs can be instrumental and needs to be strengthened in the future:

Role of VOs/ NGOs in achieving SLEM	
<ul style="list-style-type: none"> • Conceptualization or designing of programmes through research and field-based experience. • Piloting of the projects to test feasibility and outcome. • Support in planning by collecting base line data and conducting participatory rural appraisal. • Enabling community participation that include formation of sectoral committees, SHGs and other community based groups (CBOs), and in their capacity building. • Providing information and technical support so that communities can access the benefits provided under policies and programmes. 	<ul style="list-style-type: none"> • Providing technical trainings to project staff in government projects. • Working as a channel of communication between the communities and government agencies by communicating the needs and grievances of the communities to the concerned government agencies. • Mobilizing participation and behavior change in communities • Conducting social audit of the programmes. • Monitoring, assessment and review of programmes.

Apart from the VOs/ NGOs, the subject areas of sustainable development and climate change have attracted commitment from many domestic and foreign corporate foundations, CSR bodies, and philanthropic organizations. Many of these agencies are looking for opportunities for impact funding in the country in the sectors directly related to SLEM, i.e. agriculture, livelihoods and skilling, SDGs, carbon financing, green energy, climate mitigation and

adaptation projects, addressing vulnerable communities threatened with disaster and climate change. Usually, these funds are also looking at leveraging the existing public-funded programmes to increase their impact. The government institutions must create a forum to tap these funds and convert their interest into meaningful and innovative projects fostering collaboration with the private sector and financial institutions.

5.4

Analysis of Research Institutions Pertinent to SLEM

The Indian Council of Agricultural Research (ICAR) and the Indian Council of Forestry Research and Education (ICFRE) institutes are the primary research institutions

under the government contributing to the body of work related to SLEM in India. In addition, universities and other government and private funded research organizations



also contribute to knowledge building relevant to the sector. However, the role of ICAR and ICFRE institutes is critical as they are mandated to also take the research

outcomes to the field as against universities or other such bodies. The research capabilities of these two institutions are discussed in brief below.

5.4.1 Agricultural Research and NRM Institutions

The Natural Resource Management Division of ICAR conducts basic and strategic research to develop technologies for conservation, management and sustainable utilization of natural resources, ensuring food, nutritional and environmental security.

The priority areas for the NRM Division are addressing farm productivity & profitability, land degradation, water productivity, soil health deterioration and nutrient use efficiency, abiotic stresses, including climatic

aberrations and loss of tree cover, and deterioration in ecosystem services.

The division works through 15 research institutes – 10 All-India Coordinated Research Projects, three network projects and two Consortia Research Platforms, namely Water and Conservation Agriculture, with a vast network of cooperating centres and state agricultural universities. The institutes working on NRM and their respective priority areas have been summarized below:

Table 8. ICAR institutes working on SLEM related subjects

Institute	Priority Research Areas
National Institute of Abiotic Stress Management (NIASM), Baramati	<ul style="list-style-type: none"> Climate resilient agriculture and abiotic stress management
Central Agroforestry Research Institute (CAFRI), Jhansi	<ul style="list-style-type: none"> Agroforestry management
Central Arid Zone Research Institute (CAZRI), Jodhpur	<ul style="list-style-type: none"> Arid land management and solar farming
Central Coastal Agricultural Research Institute (CCARI), Goa	<ul style="list-style-type: none"> Coastal agriculture Development of integrated farming systems
Central Research Institute of Dryland Agriculture (CRIDA), Hyderabad	<ul style="list-style-type: none"> Development of integrated farming systems Crop diversification Mainstreaming rainfed/ dryland farming and agricultural disaster management Climate resilient agriculture and abiotic stress management Integrated water management & wastewater utilization Conservation agriculture and resource conservation technologies
Central Soil Salinity Research Institute (CSSRI), Karnal	<ul style="list-style-type: none"> Coastal agriculture Conservation agriculture and resource conservation technologies Climate resilient agriculture and abiotic stress management Management of problematic soils – saline, alkaline, acid and waterlogged soils
Directorate of Weed Research (DWR), Jabalpur	<ul style="list-style-type: none"> Weed management
ICAR Research Complex for Eastern Region (ICAR, RCER), Patna	<ul style="list-style-type: none"> Development of integrated farming systems Conservation agriculture and resource conservation technologies



Name of ICAR Institute	Priority Research Areas
Indian Institute of Farming System Research (IIFSR), Modipuram	<ul style="list-style-type: none"> • Development of integrated farming systems • Conservation agriculture and resource conservation technologies • Crop diversification • Organic farming
Indian Institute of Soil Sciences (IISS), Bhopal	<ul style="list-style-type: none"> • Nutrient and bio-waste management • Management of problematic soils – saline, alkaline, acid and waterlogged soils • Nano technology
Indian Institute of Soil and Water Conservation, Dehradun (IISWC), Dehradun	<ul style="list-style-type: none"> • Soil and water conservation - participatory watershed management • Hill agriculture
Indian Institute of Water Management (IIWM), Bhubaneswar	<ul style="list-style-type: none"> • Integrated water management & waste water utilization
The National Bureau of Soil Survey and Land Use planning (NBSS&LUP), Nagpur	<ul style="list-style-type: none"> • Land resource inventory, characterization & agricultural land use planning
ICAR-National Organic Farming Research Institute (NOFRI), Tadong, Sikkim	<ul style="list-style-type: none"> • Organic farming
Mahatma Gandhi Integrated Farming Research Institute (MGIFRI), Motihari, Bihar	<ul style="list-style-type: none"> • Development of integrated farming systems

ICAR has been instrumental in achieving a number of relevant research outcomes, which are aiding SLEM directly⁸⁸. Some of the achievements of ICAR in areas related to sustainable land and ecosystem management are noted below:

- Prepared soil resource maps of the country (1:1 million scale), states (1:250,000 scale) and 55 districts (1:50,000 scale), soil degradation map of the country (1:4.4 million scale) and state soil erosion maps (1:250,000 scale)
- Developed 75 model watersheds with location-specific soil and water conservation measures
- Developed sand dunes stabilization and shelter belt plantation technologies to check wind erosion and desertification
- Developed cost-effective liming technology for the amelioration of acid soils, reclamation technology for salt-affected soils and sub-surface drainage technology for waterlogged saline soils
- Developed multipurpose rubber dam for the watershed to reduce soil erosion, create water storage facility, enhance groundwater recharge and quick and safe disposal of sediments
- Designed low-cost small-scale on-line filter, fabricated and evaluated for safe use of urban wastewater in agriculture
- Prepared geo-referenced soil fertility maps for 20 states and ready reckoners for soil test-based fertilizer recommendations
- Developed a portable soil test kit/ mini lab (Mrida parikshak) to supplement soil testing service in the country (the kit is useful in analysing soil samples to distribute soil health cards among farmers)
- Developed Integrated Nutrient Management packages for major cropping systems
- Developed liquid biofertilizer formulations with a longer shelf life
- Identified potassium and zinc solubilizing bacteria and standardized vermi/ bio-enriched composting technology

⁸⁸ <https://icar.org.in/content/milestone-achievements-natural-resource-management>



- Developed Pine oleoresin coated slow-release urea and nan formulations, namely 4G nano-based nutritional agri-inputs (phosphorus, magnesium, zinc, and iron), nano zinc oxide and nano rock phosphate for higher nutrient use efficiency
- Developed a comprehensive on-line database on agroforestry entitled "Agroforestry BASE"
- Standardized different agroforestry modules for arable and non-arable lands
- Developed resource conservation technologies (zero tillage, laser levelling, bed planting, SRI, LCC etc.) to save water, nutrient, labour and energy
- Identified bio-intensive cropping systems for irrigated, rainfed, Arid, hill and coastal ecosystems of the country for effective crop diversification
- Developed 45 IFS models covering different agro-ecological zones in the country to enhance productivity profitability and livelihood
- Developed an organic farming package of practices for 51 crops/cropping systems
- Developed agri-voltaic solar farming system for raising income both from agriculture and generation of electricity (the model enables growing crops under solar panels)
- Developed solar devices like cooker, dryer, PV duster, PV winnower cum dryer, PV mobile unit, solar photovoltaic pumps for domestic and small agricultural applications.
- Developed integrated weed management practices for different crops/ cropping systems of the country
- Identified bioagents for effective control of water hyacinth, *Parthenium* and velvet bush
- Provided agro-advisories based on real-time weather data
- Demonstrated climate-resilient technologies in 151 most vulnerable districts in farmers' participatory mode to cope with various climatic aberrations

While agricultural extension activities are being conducted both by research organizations as well as state agriculture departments, knowledge on successful SLEM practices are similarly required to be disseminated and incorporated in field projects. This activity is currently not being coordinated in a central manner by any institution. A Centre of Excellence for Sustainable Land Management can be mandated to document successful SLEM best practices developed through research and provide expertise to incorporate them in national or local projects. It will bridge one of the key gaps between research and field implementation in the sector.

5.4.2 Forestry Research

Indian Council of Forestry Research and Education (ICFRE) is an apex body in India for forestry research extension. The Council has a pan India presence with nine regional research institutes and five centres in different bio-

geographical regions across the country. A lot of research that ICFRE institutes have done has direct relevance to SLEM. Key research under the institutions are mentioned in the table below:

Table 9. ICFRE institutes working on SLEM related subjects

S. No.	Institute	Key areas of research
1	Arid Forest Research Institute, Jodhpur	<ul style="list-style-type: none"> • Plantation and vegetation species for restoration of degraded land in the arid areas • Tackling wind and water erosion through measures such as rainwater harvesting, afforestation of degraded hills through afforestation, rejuvenation of rivers
2	Forest Research Institute, Dehradun	<ul style="list-style-type: none"> • Reclamation and ecological monitoring of mined areas • Geological, geomorphological and micro-morphological studies on skeletal and sodic soils • Planting stock improvement programme of different species • Development of technology for reclamation of wastelands, nutrient replenishment, groundwater development



S. No.	Institute	Key areas of research
3	Himalayan Forest Research Institute, Shimla	<ul style="list-style-type: none">• Forestry research and livelihoods• Restoration of mining areas• Nursery techniques• Soil and moisture conservation models• Grasslands restoration• River rejuvenation• Eco-rehabilitation of cold deserts, mined areas and regeneration of coniferous and broad-leaved forests• Activities on management practices, including insect-pests management in temperate forests and alpine areas• Popularization of agroforestry and other related extension activities
4	Rain Forest Research Institute, Jorhat (Assam)	<ul style="list-style-type: none">• Working with farmers to adopt agroforestry practices• Enriching farming communities and organizing extension programmes for local communities• Integrated farming systems• Reducing the impact of slash and burn cultivation system.• Bamboo plantation for land restoration, use of groom grass cultivation, focusing on bamboo restoration
5	Tropical Forest Research Institute, Jabalpur	<ul style="list-style-type: none">• Reclamation of coal, iron and manganese mines• Carbon sequestration on industrial areas• Study on species diversity• Management of industrial plantation• Developing agroforestry models• Focus on good soil labs and trained staff
6	Institute of Forest Genetics and Tree Breeding, Coimbatore	<ul style="list-style-type: none">• Assess the genetic variability and identify varieties within the forests of Western and Eastern Ghats and the Island forests• Work on the indigenous species available in the forests for productivity enhancement, biodiversity conservation.• Working on selected exotic species of high economic importance and contribute to livelihood enhancement and the development of tree-based enterprise
7	Institute of Forest Biodiversity, Hyderabad	<ul style="list-style-type: none">• Quantitative ecological assessment and documentation of biodiversity of the Eastern Ghats• Genetic resource assessment of endemic and rare plants of the Eastern Ghats for conservation planning• Threat assessment for classification of the Eastern Ghats biodiversity into rare, endangered and threatened species• Ex-situ conservation of the RET and endemic species of Eastern Ghats by establishing germplasm banks, seed storage rooms and tissue culture rooms• Utilization of the Eastern Ghats biodiversity by applying the principles of genetic improvement and clonal propagation• Effects of climate change on the biodiversity of the Eastern Ghats and their mitigation• EIA of mining and other mega projects on the Biodiversity of the Eastern Ghats and their eco-rehabilitation



8	Institute of Forest Productivity, Ranchi	<ul style="list-style-type: none"> • Undertake and promote forestry research, education and extension, leading to scientific and sustainable management of forest resources. • Provide scientific advice to the government agencies aiding informed decision making in matters of national and regional importance and international commitments and to address forestry research needs. • Provide technical assistance and material support to various stakeholders in their forestry based programmes for conservation and sustainable use of forest resources. • Research in silviculture and forest management for development of natural and artificial regeneration practices, including nursery & plantation techniques. • Develop appropriate cultivation, harvest and postharvest techniques for important NTFP and lesser known tree species. • Undertake research on forest productivity, eco-restoration and rehabilitation of mined out areas & other stressed/degraded/difficult sites.
9	Institute of Wood Science & Technology, Bengaluru	<ul style="list-style-type: none"> • Wood anatomy and relevant properties • Development of technologies for wood processing and wood composite materials • Tree improvement and propagation – Agroforestry and Silviculture • Forest and wood protection • Wood chemistry and bio-energy
10	Forest Research Centre for Skill Development, Chhindwara	<ul style="list-style-type: none"> • Eco-restoration • Agroforestry models • Producing quality planting material of selected species for improving forest productivity • Provenance trials of selected species • Biofertilizers and biopesticides
11	Forest Research Centre for Bamboo & Rattan, Aizawl	<ul style="list-style-type: none"> • Focusing on conservation and sustainable utilization • Establishing germplasm bank of bamboo and canes • Establishing bamboo setum and canetum • Nursery technology, including cultivation practices • Macro and micro-propagation • Improving the genetic through clonal garden and certification • Leveraging technology for value addition, edible shoot processing etc. • Developing products, including bamboo composites • Using bamboo-based tools/machines for bamboo working • Extending bamboo-based knowledge and technologies to stakeholders
12	Forest Research Centre for Livelihood Extension, Agartala	<ul style="list-style-type: none"> • Generating sustainable livelihood alternatives through the application of forestry and NRM techniques • R&D in the bamboo sector, including propagation, preservation and value addition • Undertaking on-farm Participatory Research for productivity enhancement • Assessing the impacts of skills training and technology demonstration • Conserving biodiversity



S. No.	Institute	Key areas of research
13	Forest Research Centre for Eco-rehabilitation, Prayagraj	<ul style="list-style-type: none">• Introducing new species and testing agricultural wastelands where such species are suitable• Planting stock improvement programme• Wasteland reclamation• Development of agroforestry models• Reclamation of mined areas through afforestation (e.g. Pratapgarh and Sonbhadra of UP)• Productivity of ecosystem, propagation and dissemination of technology, and related capacity building
14	Forest Research Centre for Coastal Ecosystem, Visakhapatnam	<ul style="list-style-type: none">• Carrying out focused research on the biodiversity of the Eastern Ghats and FGFRM of mangrove and coastal ecosystems• Researching marine wood biodegradation• Disseminating available technologies/ processes/ tools to user groups for conservation and sustainable use of forest resources• Supporting the lead institute in research education and extension in the area of jurisdiction

Research institutions have an invaluable role in providing technical backstopping to the implementing agencies in terms of knowledge, know-how and supporting the upscaling and measurement of results and outcomes. In reality, there has been limited reach of these institutions up to field implementing units. Technological developments, however, have made it feasible to reach out to a larger set of stakeholders. The research institutions should be urged to create "services" so that the implementors are able to connect and avail those services to seek solutions to their

problems or seek answers to critical questions.

The Centre of Excellence, discussed in the previous section, can also coordinate in documenting the research outcomes in the forestry sector to take the viable methodologies and standard operating protocols to the field. The complexity of the restoration and conservation efforts that constitute SLEM requires closer cooperation between research institutions and implementing agencies in project formulation, implementation, and monitoring.

5.5

Dedicated Institutions for Implementation of SLEM

Practically, all the aspects related to land management including land improvement is with the State governments, including forests and land acquisition which is concurrently held the Central government and thus the institutional framework at the state level is critical for implementing SLEM measures. However, guided by the Constitutional role in social and economic planning, since the very beginning of the planning era, the Central Government has been playing a supporting role in the form of centrally assisted programmes and schemes on land with a view to maintaining productivity and sustainability of land in the country. Within the Central and State governments, land is apersed between various ministries and departments

each having its own policies, laws, regulations, programmes, missions and targets and an institutional structure to carry these forwards. Thus, in terms of distribution of role, functions and responsibilities, the institutional presence and decision making on land can be regarded to be present in two constructs- Horizontal institutions (Central ministries and State departments); Vertical (Decentralized institutions).

The horizontal institutional ecosystem on land at the central level involves all the Central level ministries including industry, roadways, railways and defence but from the direct relevance from environment and land degradation standpoint, the five ministries MoEFCC,



MoRD-DoLR, MoJS, MoAFW and MoPR have the pivotal role to play. However, there is an issue with regard to role clarity and allocations within the horizontal institutional distribution which affects the overall outcome of the initiatives and their ground-level implementation. Historically, the environment ministry was established in response to the need for preventing environmental degradation including land degradation and continues to be the nodal ministry with the mandate to improve natural resource management for the security of life and livelihoods of people. The MoEFCC is the nodal ministry for UNCCD and LDN national targets but in terms of the extent and contribution to land degradation as well as the potential for restoration of degraded land ecosystems, the role and responsibility also substantially lies with the MoAFW and the MoRD-DoLR. Thus, the target has to be shared or co-owned by these two Central ministries also. In other words, technically the owner of restoring 26 Mha until 2030 is with the MoEFCC while the majority of land where land improvement is most needed and where it can be potentially made, in addition to stressed forest lands, falls within the domain of the MoAFW and the MoRD-DoLR. All lands whether forest or outside forests have the protection of environmental laws and MoEFCC has an overarching institutional role to play in that context.

Similar horizontal distribution construct follows at the State level departments and ministries. Thus, independent state-level institutions handle land and agricultural administration, and lack of integration creates uneasy administration. At the State level, several departments are

involved in various aspects of land. For example, land data, land administration and land legislation are ordinarily held by the three separate departments that do not work in perfect coordination and often lead to huge data and information gap impacting holistic planning. The horizontal distribution and spreading present an administrative and governance challenge for SLEM.

In India, people's involvement in managing their common ecological assets is a clear mandate for which the decentralized institutions have been Constitutionally and legally empowered. The vertical (decentralized) distribution of role and responsibilities on land falls with the Panchayats at all levels where the Village Panchayats and Gram Sabha have most critical role to play and have the statutory powers over management of common property resources such as lands attached to ponds, shamshan, maidan, khatian, village pastures and village roads. The category of such common lands and powers to manage them vary in each state. The decentralized institutional control over all common lands and other CPRs of certain groups such as the Scheduled Tribes in Scheduled Five Areas and Tribal communities of North Eastern States is Constitutionally and legally recognized under the self-rule laws. In these areas, the community institutions such as Gram Sabha, Autonomous Councils, or the Village Councils are responsible for land resources management within their jurisdiction. While the mandate is clear at the decentralized level, but the capacity and intent in some cases is lacking.

Institution at for National level coordination	Institution for water budgeting	Institutions for District level planning
<ul style="list-style-type: none"> • Ensure that horizontal and vertical linkages between ministries, departments and village level institutions are clearly established either by empowering existing institutions at the National and State level or by creating a new institutional set up. • Revival and strengthening of existing SLUBs with statutory and financial powers can be thought of as an overarching institution to oversee and regulate land based on SLEM parameters should be considered on priority. • An existing institution such as the NRAA can also be strengthened to play the role. 	<ul style="list-style-type: none"> • Institution at the Central level needed for conducting water budgeting at Basin, Sub-Basin, Watershed, and Sub-Watershed level with sufficient scientific rigour. • The higher level water budgeting keeping the national priorities in mind would be important before the water budgeting at GP or village is attempted or encouraged. • Establishment of a National Bureau of Water Use Efficiency that aims at ensuring efficiency and water budgeting across the water-intensive sectors at the national level, agriculture being on priority, can be fast-tracked. 	<ul style="list-style-type: none"> • A forum at the district level where all the land-based data can be accessed and visualized and landscape-level plans can be studied, compiled and finalized with full ownership of each of the respective line departments. • The forum needs to be supported with adequate human and technical resources including development of a planning tool which has been prepared keeping the needs of the relevant departments. • The forum and the plans they make would then become a solid foundation for implementation of all programmes and schemes on LDN.



CHAPTER 6



Public Investments in
Land and Ecosystem Management in India



In the form of schemes and programmes of the Central and state governments, significant public investments have been made towards addressing land degradation and ecosystem management in the country. Four Central ministries implement most of the Central government programmes and schemes related to SLEM. They are the Ministry of Environment, Forest and Climate Change (MoEFCC), Ministry of Agriculture & Farmers' Welfare (MoAFW), Ministry of Jal Shakti (MoJS) and Ministry of Rural Development (MoRD). This chapter consolidates the information on budgetary allocation to present an overall view on the trends in investments in land development

related preprogramme under the Central and state governments.

While the Central and state programmes reviewed for the purpose of this chapter do not specifically mention SLEM as their prime objective, the components of these programmes, however, support interventions that have similar objectives as those under SLEM and therefore can be considered good proxies for SLEM. Accordingly, the financial allocations of these programmes have been assessed to understand the status of public investment in this area.

6.1 Budgetary Provisions by Ministry of Environment, Forest and Climate Change

The Ministry of Environment, Forest and Climate Change (MoEFCC) is the nodal agency in the Central Government for overseeing the implementation of India's environment and forest policies and programmes relating to the conservation of the country's natural resources.

There were twelve major programmes and schemes of the MoEFCC that had budgetary allocations towards land and ecosystem management in 2016-17. However, the number of programmes and schemes were reduced to nine in 2020-21 as some were subsumed under umbrella schemes.

However, the overall budgetary allocation for the SLEM related schemes between 2016-17 and 2020-21 increased by 6% from Rs. 8.44 billion to Rs. 8.94 billion. The

budgetary increase was not uniform, and there were significant annual variations in the allocations. The annual changes in allocation being 16%, 3%, 21% and 12% for the years 2017-18, 2018-19, 2019-20 and 2020-21, respectively. The overall expenditure for the three years (2016-17, 2017-18 & 2018-19) was between 97% and 98%.

In terms of budgetary allocation, the four major programmes pertinent to SLEM for the MoEFCC till 2018-19 were Project Tiger, Integrated Development of Wildlife Habitats, Green India Mission and National River Conservation Programme. However, in 2019-20 and 2020-21, the number of schemes reduced to three, with the National River Conservation Programme being shifted to the new Ministry of Jal Shakti.

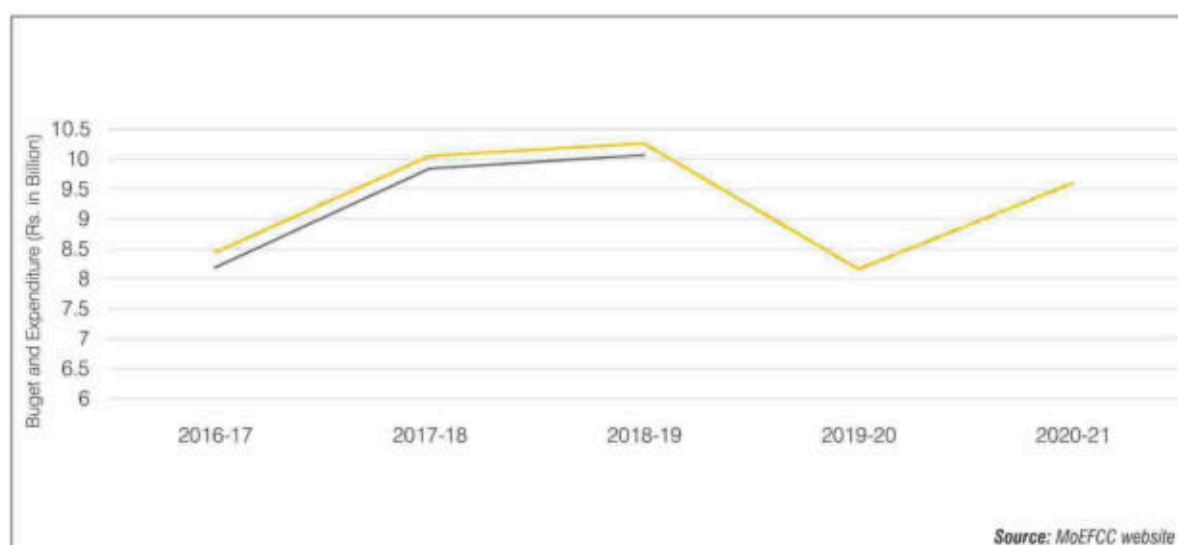


Figure 4. Budget and Expenditure (in Rs. billion) for SLEM Related Schemes under MoEFCC between 2016-17 to 2020-21

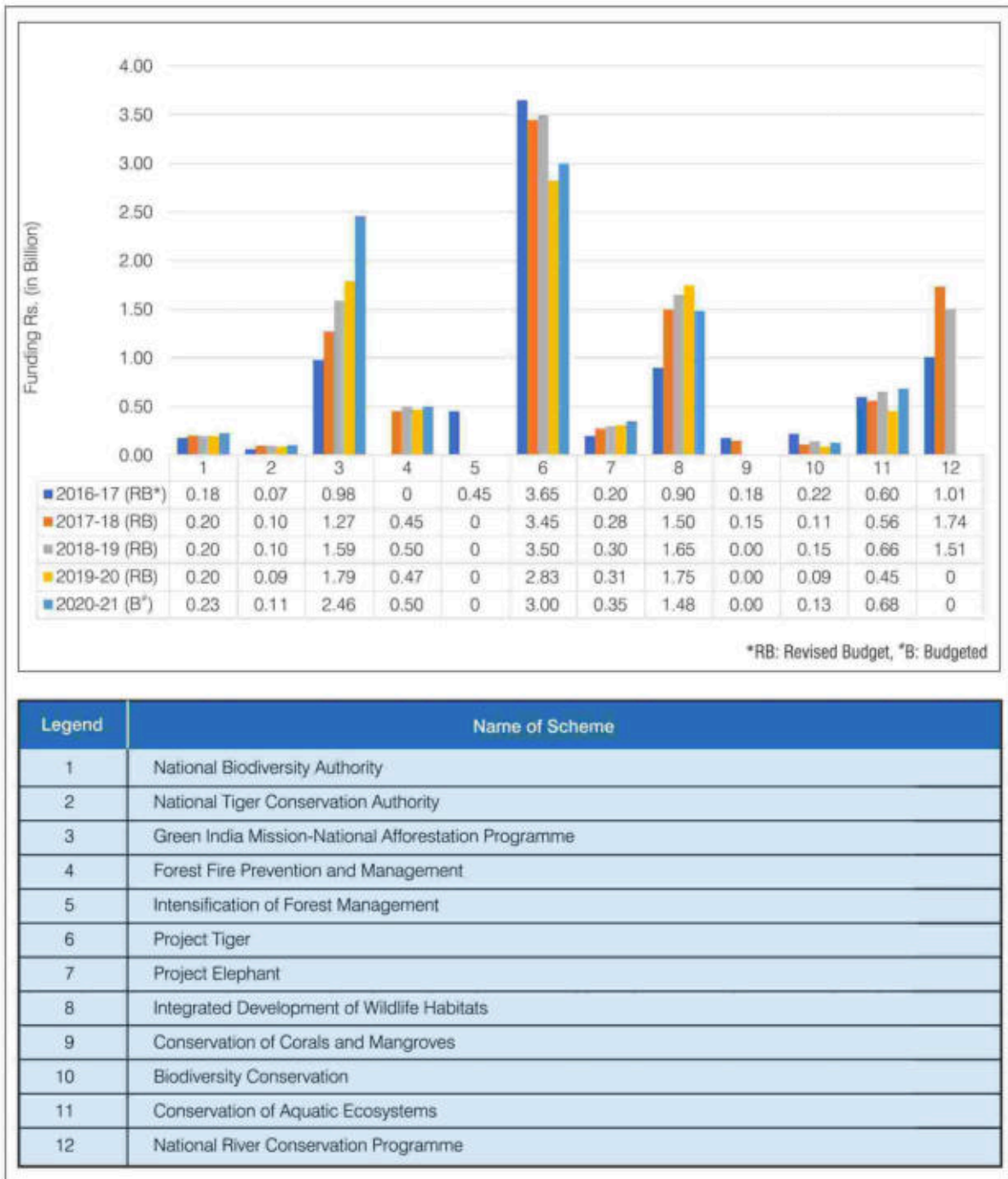


Figure 5. Funding of MoEFCC for SLEM related schemes (Source: MoEFCC website)

Overall, the budget allocation for the MoEFCC has been between Rs. 800 and Rs. 1,000 crore since 2016-17. While the budgetary allocation of Project Tiger has reduced by 17.6% from Rs. 365 crore to Rs. 300 crore in five years, the budgetary allocation for Green India Mission increased by

151% from Rs. 98 crore to Rs. 246 crore during the same period. The budgetary allocation for Integrated Development of Wildlife Habitats increased by around 65% from Rs. 90 crore to Rs. 148 crore in five years. Budget details of the MoEFCC for activities related to SLEM are given in Annexure 5.



Funding under CAMPA

The Compensatory Afforestation Fund also has emerged as an important source of funding in the forestry and wildlife sector. The funds are used for undertaking compensatory afforestation, assisted natural regeneration, conservation and protection of forests, infrastructure development, wildlife conservation and protection, capacity development and other related activities. The National CAMPA Authority has

released Rs. 21.1, 26.5, 33.7, 35.2 and 53.1 billion in 2015-16, 2016-17, 2017-18, 2018-19 and 2019-20, respectively, to the states.

As funds under CAMPA are directly related to the extent of forest land diverted, this is skewed towards the relatively higher forested states, which comparatively have larger diversion of forest land.

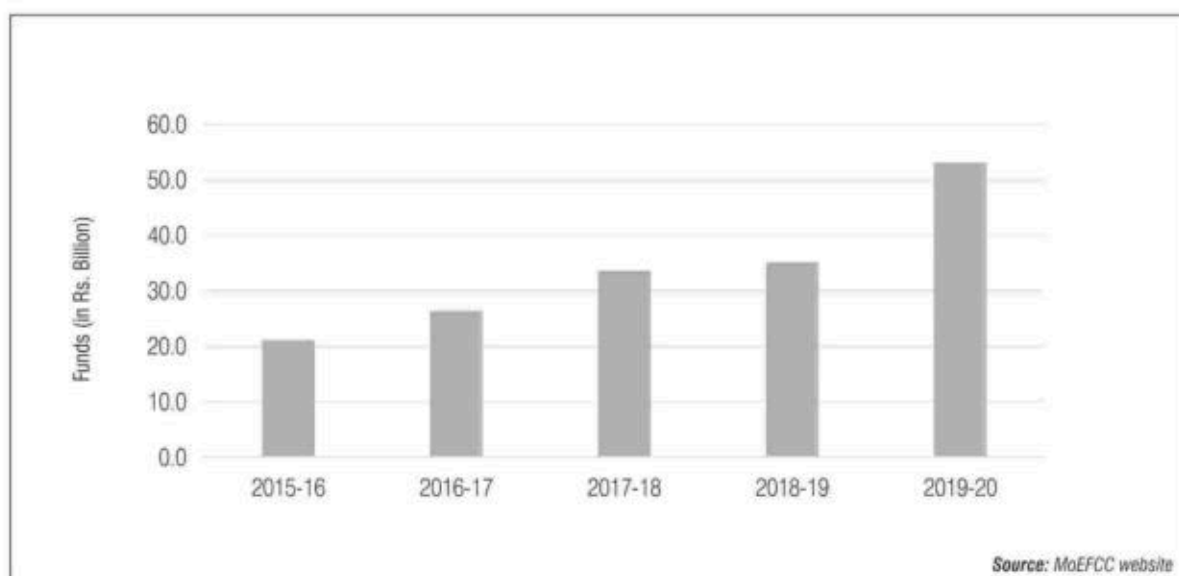


Figure 6. Funds (in Rs. billion) released under CAMPA to States

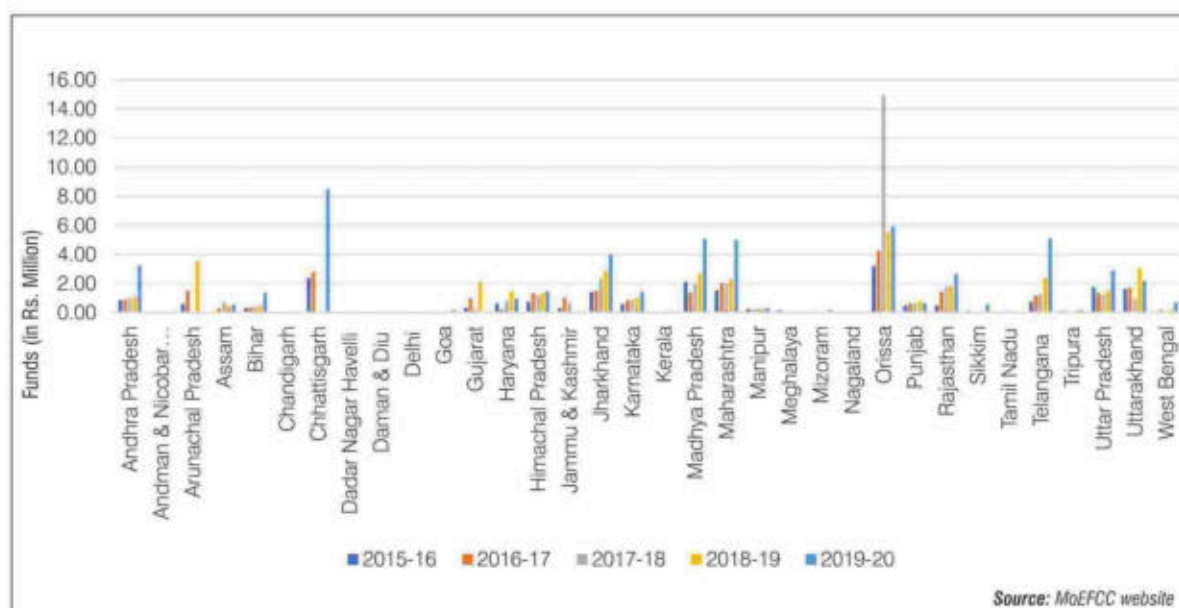


Figure 7. Funds (in Rs. Million) released under CAMPA to States



6.2

Budgetary Provisions by Ministry of Agriculture and Farmers' Welfare

The programmes implemented by the Ministry of Agriculture and Farmers' Welfare (MoAFW) play an important role in maintaining food security, land productivity and supporting the rural economy in the country, given that the agriculture sector employs about 42% of India's workforce. The sector has been one of the focus areas with the government's thrust on doubling farmers income.

While it is difficult to identify how much funds within schemes are allocated for activities categorized under

SLEM, budget provisions for land-based schemes have been analyzed. Over the past five years, eight to nine relevant programmes/schemes related to SLEM have been developed under the MoAFW. One of the schemes – National Mission on Oil Seed and Oil Palm – does not have a budgetary allocation for the past two years, while the National Bamboo Mission has had budgetary allocation since 2018-19. As in 2020-21, there are eight operational schemes/programmes pertinent to SLEM being implemented by the MoAFW.

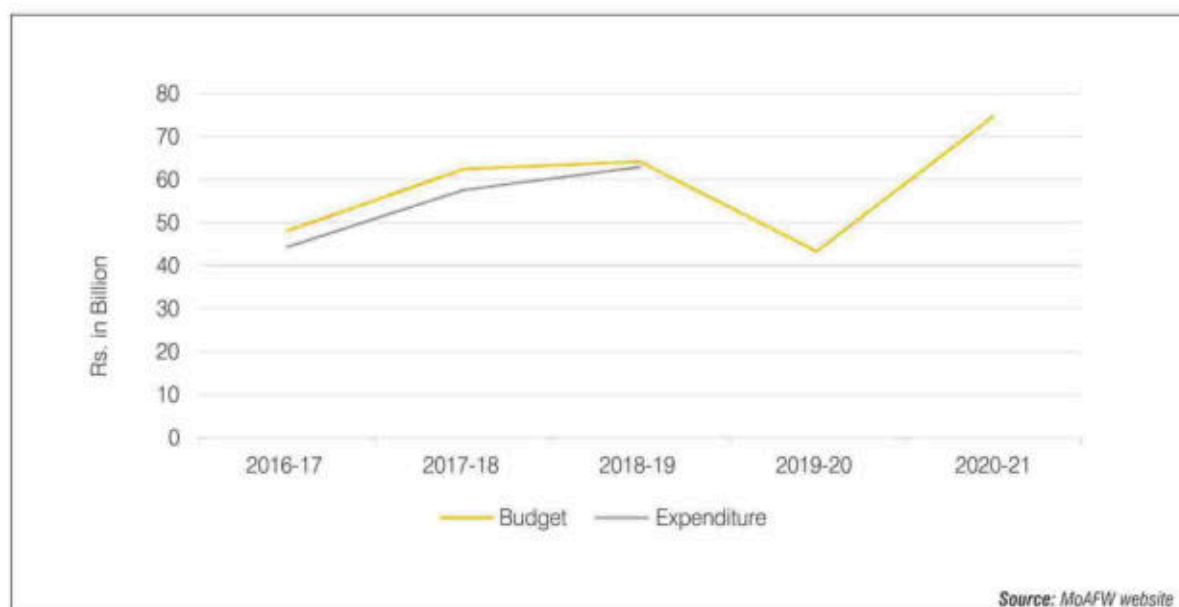


Figure 8. Overall Budget and Expenditure (in Rs. billion) for different SLEM Related schemes under MoAFW between 2016-17 to 2020-21

The overall budgetary allocation for land-based schemes grew by around 38% from Rs. 54.22 billion in 2016-17 to Rs. 74.76 billion in 2020-21. The overall expenditure of the schemes between 2016-17 to 2018-19 was in the range of 92% to 98%. Budget details of the MoAFW for activities related to SLEM can be seen in Annexure 6.

Two of the schemes – Pradhan Mantri Krishi Sinchai Yojna (PMKSY- Per Drop More Crop) and National Mission on Horticulture – get a significant share from among the eight schemes. The share was around 76% in 2016-17 and around 84% in 2020-21.

PMKSY's budgetary allocation has grown by 101% in the last five years to Rs. 40 billion from Rs. 19.90 billion. During

the same period, the National Mission on Horticulture has grown by 38%, from Rs. 16 billion to Rs. 23 billion.

The Paramparagat Krishi Vikas Yojna has grown by 318% from Rs. 1.20 billion to Rs. 5 billion between 2016-17 and 2020-21.

Two important schemes – National Project on Soil Health and Fertility and National Project on Agroforestry – recorded budgetary downsizing of around 25% each between 2016-17 and 2020-21.

The Rainfed area and Climate change programme recorded a growth in the allocation of 13% from Rs. 1.9 billion to 2.03 billion during the same period.

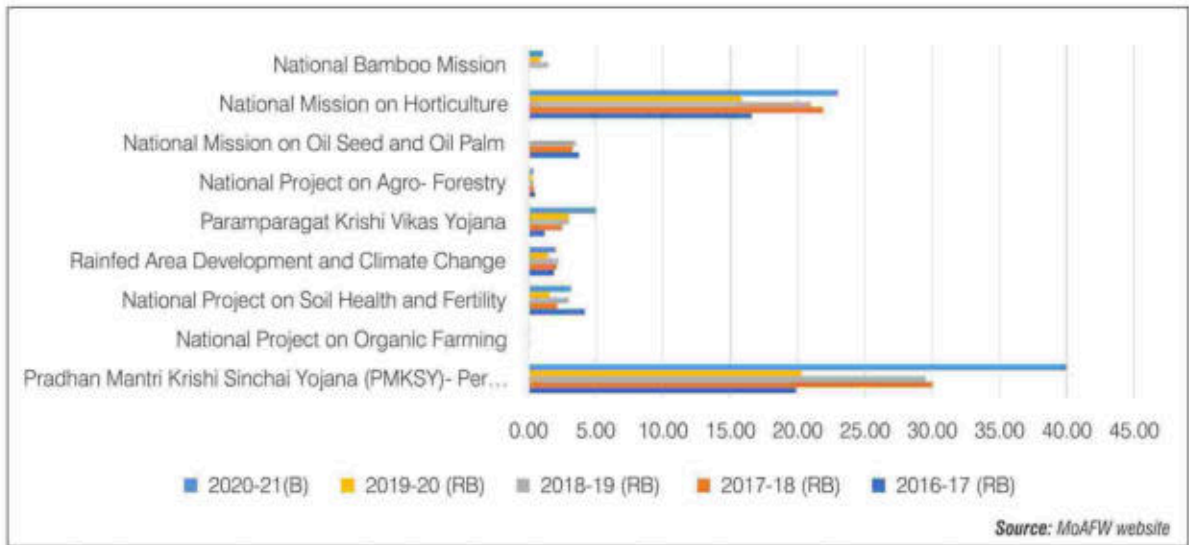


Figure 9. Revised Estimates (in Crore) for different SLEM Related Schemes under MoAFW between 2016-17 to 2020-21

6.3 Budgetary Provisions by Ministry of Jal Shakti

The Ministry of Jal Shakti was formed in May 2019 by merging two ministries - Ministry of Water Resources, River Development & Ganga Rejuvenation, and Ministry of Drinking Water and Sanitation. The Ministry of Jal Shakti is responsible for laying down policy guidelines and programmes to develop and regulate the country's water resources, drinking water, and sanitation.

In the last five years, at any point in time, only five programmes/ schemes pertinent to SLEM were operational under the MoJS. While the National River Conservation Programme operated from under the ministry's aegis from 2017-18 onwards, the Accelerated Irrigation Benefit Programme (operational earlier) was subsumed under the PMKSY. The National Water Mission was also operational till 2017-18, and the Atal Bhujal Yojna commenced from 2019-20.

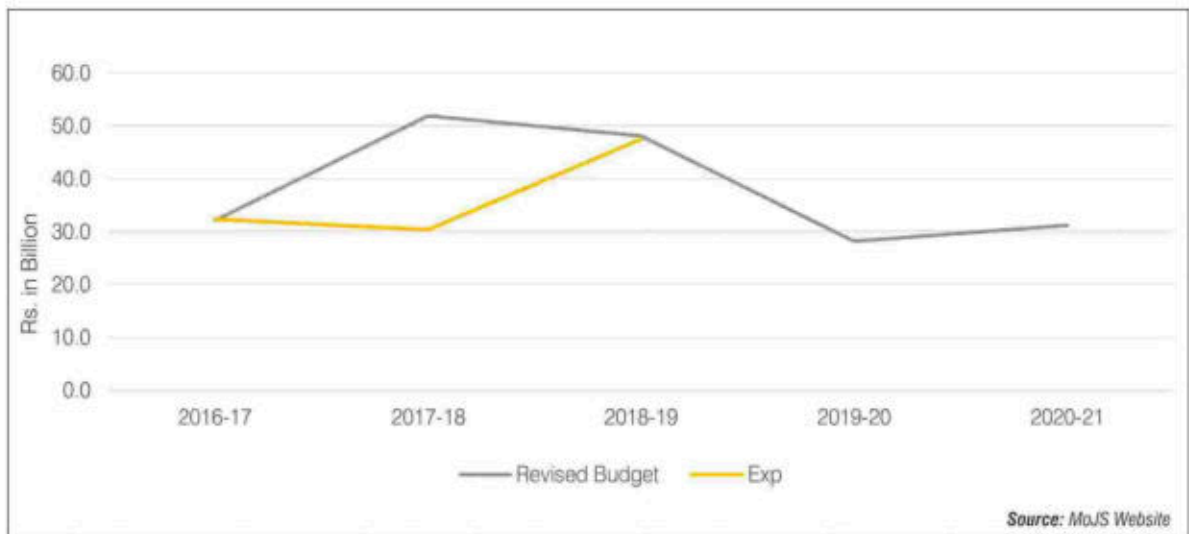


Figure 10. Budget and Expenditure (in Rs. billion) for Different SLEM Related Schemes under Ministry of Jal Shakti between 2016-17 to 2020-21



The overall budget for programmes/schemes related to water management fell by around three per cent between 2016-17 and 2020-21 from Rs. 32.16 billion to Rs. 31.16 billion. In 2020-21, the three schemes, namely Har khet ko Pani, National River Conservation Scheme and Namami Gange National Ganga Plan, constituted around 34%, 27% and 26%, respectively, of the total budget under this category in the ministry. While overall expenditure was around 100% in 2016-17 and 2018-19, it was 58% in 2017-18 due to poor utilization under the Namami Gange Scheme.

The budgetary allocation for Har Khet ko Pani has grown to Rs. 10.51 billion from Rs. 4.21 billion, recording a growth of

150% in the last five years. Between 2017-18 and 2020-21, the budgetary allocation of the National River Conservation Programme has grown to Rs. 8.4 billion from Rs. 7.23 billion, witnessing a growth of 16%. However, the Namami Gange-National Ganga Plan has seen a budgetary reduction of 52% from Rs. 16.75 billion to Rs. 8 billion.

The Ground Water Management and Regulation Scheme has recorded positive budgetary growth of 139% in the five years, from Rs. 1.15 billion to Rs. 2.75 billion.

Budget details of the MoJS for activities related to SLEM are given in Annexure 7.

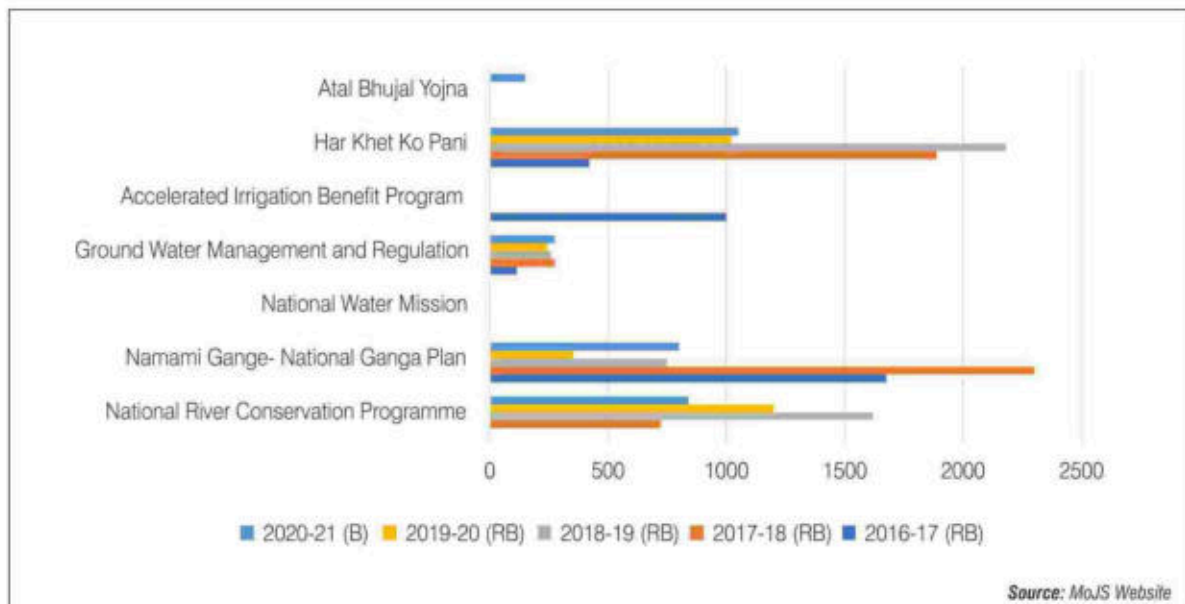


Figure 11. Funding for SLEM Related Schemes under Ministry of Jal Shakti between 2016-17 and 2020-21

6.4

Budgetary Provisions by Ministry of Rural Development

Two programmes of the ministry, which are directly promoting SLEM, are the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) and the Pradhan Mantri Krishi Sinchai Yojna - Watershed Development Component (WDC-PMKSY). Expenditure on works that fall under natural resources management, as defined in the MGNREGS guidelines, forms a substantial part of the expenditure under the scheme. In 2019-20, of the total expenditure of Rs. 932.24 billion, Rs. 618.82 billion or 66.4% was spent on NRM works.

For WDC-PMKSY, the revised estimates for the year 2019-20 was Rs. 20 billion. The trends of the expenditure/allocation in these two programmes are as follows.

Budget details of the MoRD for activities related to SLEM are given in Annexure 8.

The Reserve Bank of India publishes a report on the expenditure done by the states/UTs in the key sectors. Data from the report has been used to analyze the expenditure in the states on forestry and soil and moisture conservation activities in the following two sections.

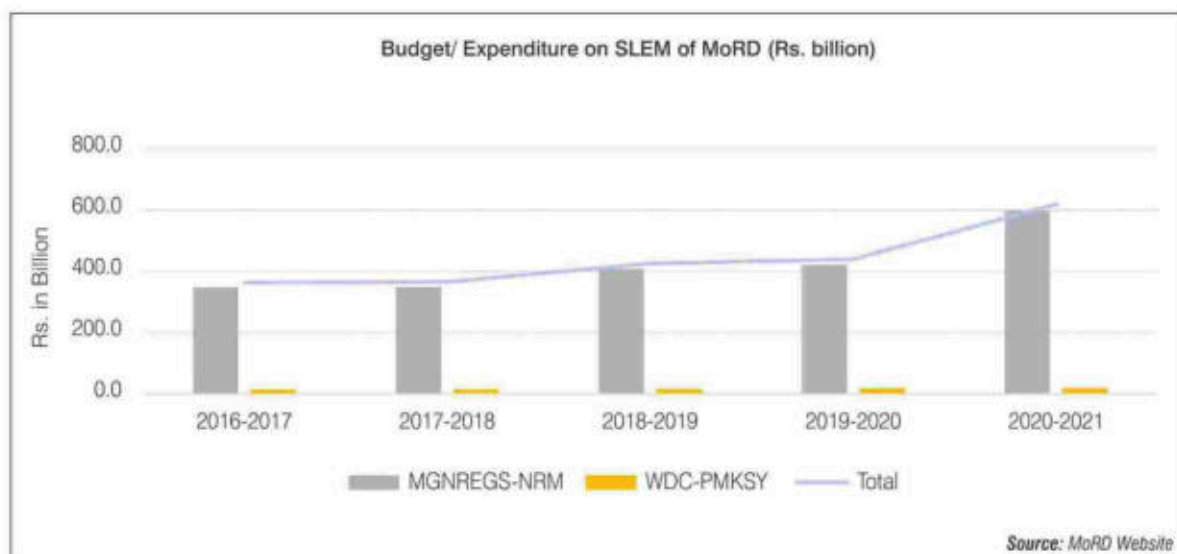


Figure 12. SLEM related funding of MoRD

6.5

Expenditure by States in Forestry Sector

The total expenditure of 29 states in the forestry sector from 2016-17 to 2018-19 was compiled. The aggregate expenditure in 2018-19 was found to be Rs. 199.84 billion. While estimates vary, about 60-70% of the budget is allocated for establishment costs, and the rest are for

works. Compared to the previous two years, expenditure in 2018-19 has shown an increase of 5.8%. Expectedly, larger states like Maharashtra, Madhya Pradesh, Karnataka and Gujarat were the forerunners in allocating funds to the sector.

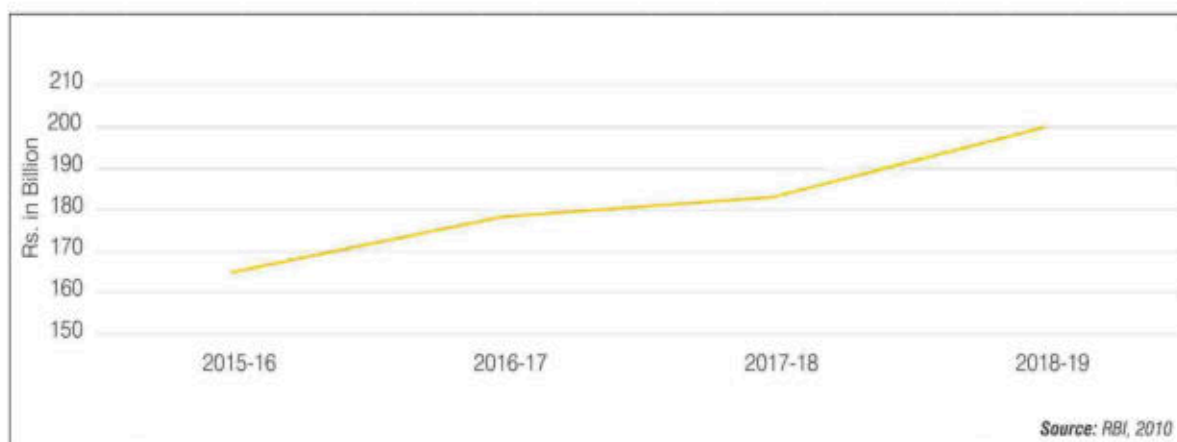


Figure 13. Aggregated Forestry Sector funding (in Rs. billion) by States

Another metric, expenditure per sq km, provides some interesting insights. This metric shows that the sparsely forested states such as Haryana, Punjab and Gujarat lead compared to other states. The average money spent per sq km of forest for the country is Rs 0.285 million. In

comparison, major forest states such as Madhya Pradesh, Karnataka, Chhattisgarh, Uttarakhand and Kerala were Rs 0.32 million, 0.44 million, 0.19 million, 0.27 million and 0.29 million, respectively.

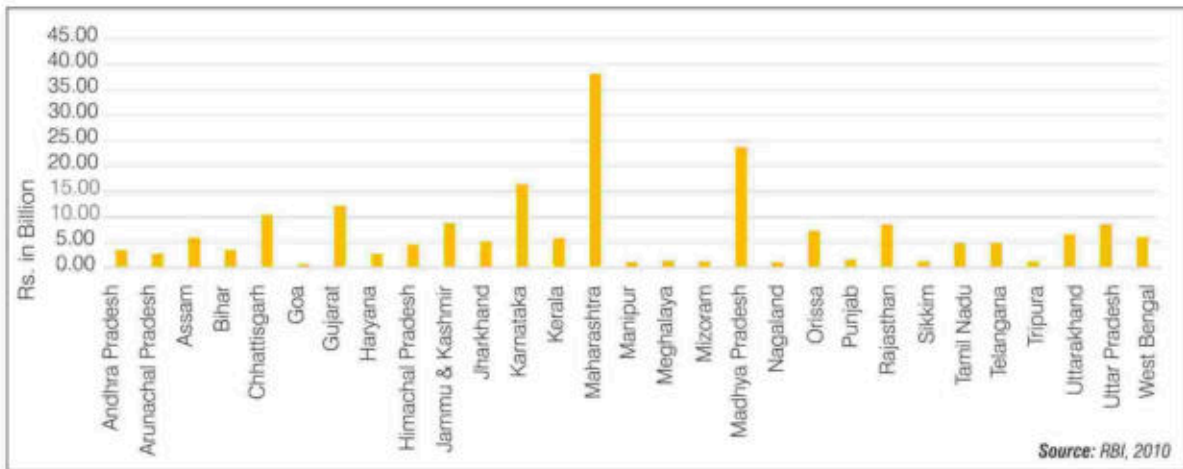


Figure 14. Forestry Sector funding (in Rs. billion) state-wise 2018-19

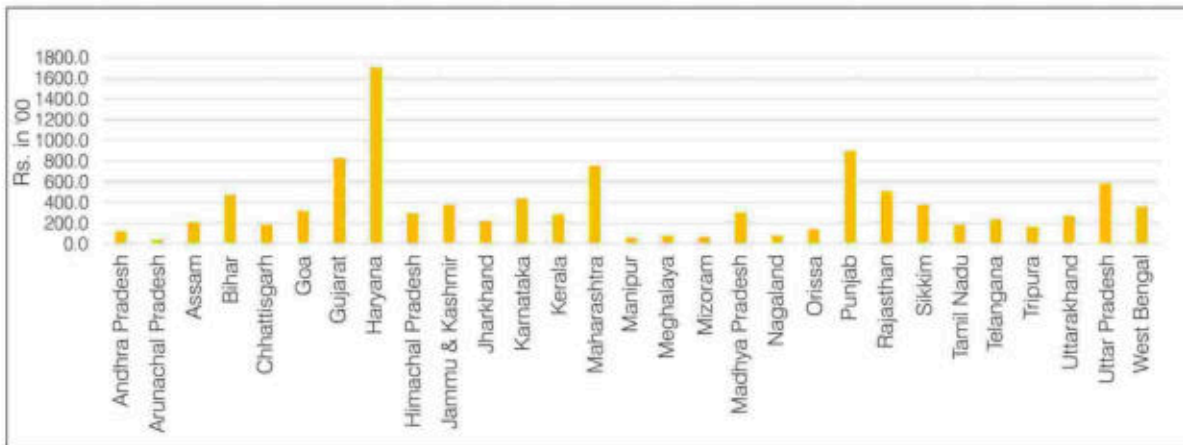


Figure 15. Forestry Sector funding per sq km of forests state-wise (Rs. '00)

The comparison of expenditure per ha of forest area with per capita availability of forests in the states also shows that the funding in low forested states such as Haryana, Punjab, Uttar Pradesh and Bihar is higher. In contrast, the North

Eastern States, which are comparatively less populated, receive much lesser funds than the rest of the states.

State-wise details on expenditure by the State Forest Departments are given in Annexure 9.

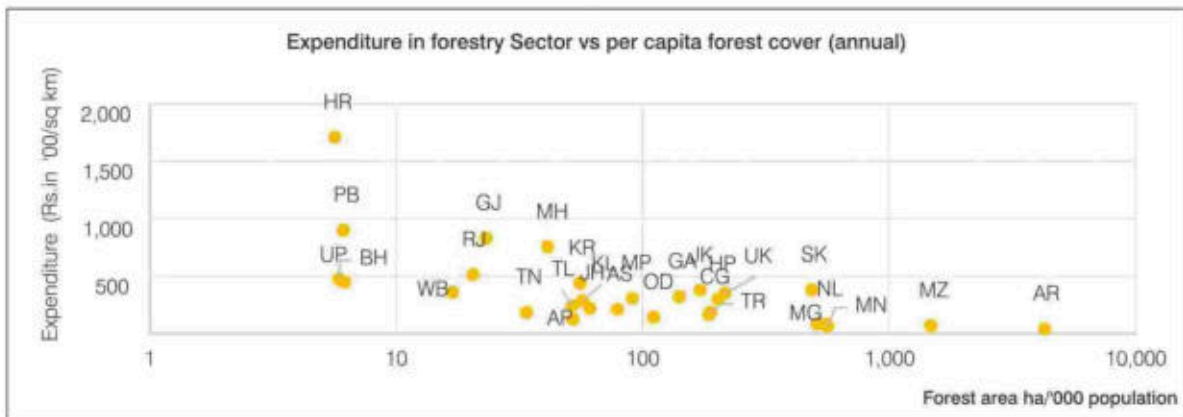


Figure 16. Comparison of per expenditure in per sq km of forests with per capita availability of forests State wise



6.6 Expenditure by States on Soil and Moisture Conservation

State governments under the agriculture department also allocate funds for soil and moisture conservation activities under various schemes, including watershed programmes. A compilation of the expenditure for these activities across states suggests that the aggregate

funding in this sector was Rs. 45.56 billion, Rs. 50.06 billion, Rs. 61.68 billion and Rs. 62.55 billion for 2015-16, 2016-17, 2017-18 and 2018-19, respectively.

State-wise details on expenditure on soil and moisture conservation can be seen in Annexure 10.

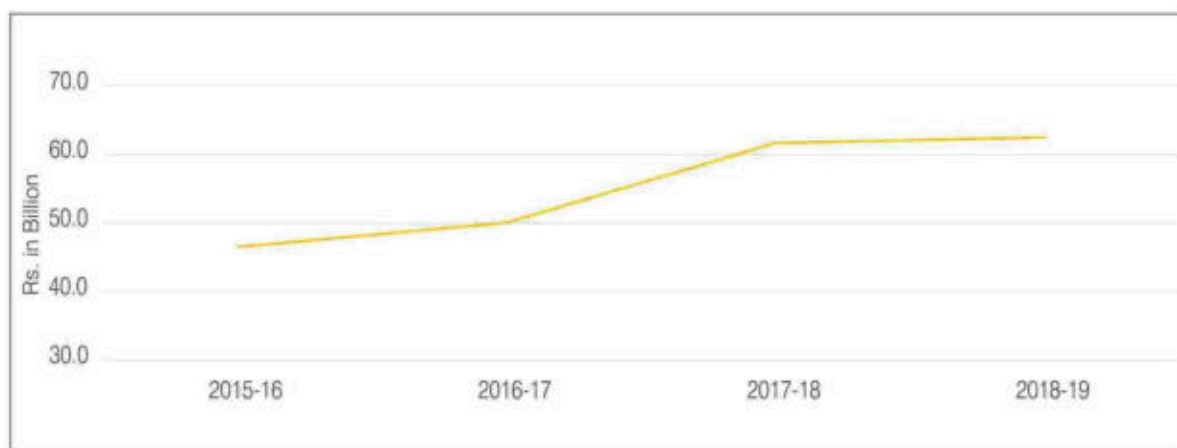


Figure 17. Funding on Soil and Moisture Conservation by States (Rs. bn)

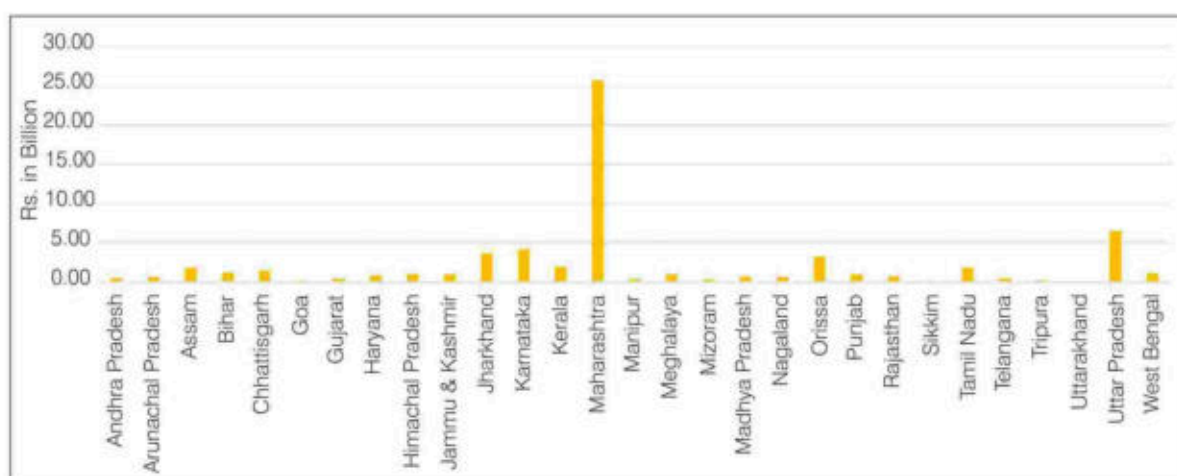


Figure 18. Funding on Soil and Moisture Conservation state-wise in 2018-19

6.7 Combined Budgetary Provisions for four Central Ministries and States on SLEM Related Schemes

6.7.1 Contribution by the Schemes of Central Government

The compiled budget outlays of the four ministries for SLEM related schemes have been Rs. 448.90 billion to 547.62 billion between 2016-17 and 2018-19. of the total,

the MoRD's share has been about 80%. While the MoEFCC is the nodal ministry for SLEM related activities, its share in terms of outlay of funds is about 2 per cent.



Figure 19. Ministry wise total funding by Central ministries on SLEM related programmes

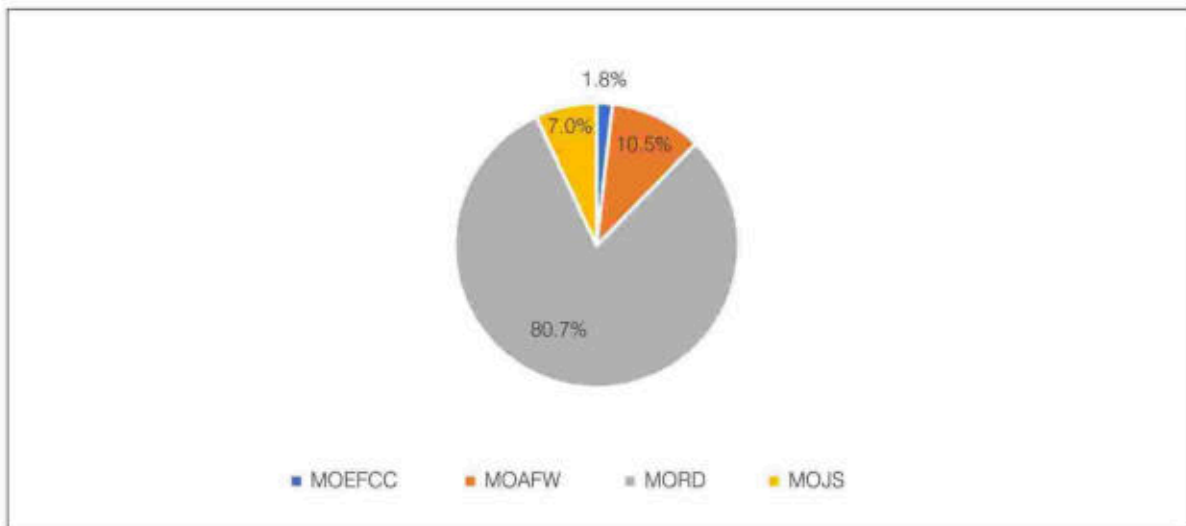


Figure 20. Share of funding of Central ministries on SLEM related programmes 2016-17 to 2019-20

6.7.2 Contribution by Central and State Governments for SLEM Related Schemes

If the contribution of the schemes (Central and state governments) are added, the overall funding is being estimated to be between Rs. 700 billion and Rs. 836.14 billion from 2016-17 to 2019-20. While central funds contribute 68%, the rest are made by the states.

Budgetary details of SLEM related activities across Central and state governments are presented in the Table 10:

**Table 10.** Overall utilization of funds for SLEM related activities

Ministry/Department/ States	2016-17		2017-18		2018-19		2019-20	
	No of schemes	Expenditure (Rs. billion)	No of schemes	Expenditure (Rs. billion)	No of schemes	Expenditure (Rs. billion)	No of schemes	Expenditure (Rs. billion)
MoEFCC - Schemes	11	8.19	11	9.6	10	9.96	9	7.98
MoEFCC- CAMPA		26.47		33.7		35.24		53.11
MoAFW	8	44.33	8	57.6	9	62.96	8	43.34
MoRD	2	364.07	2	366.85	2	427.22	2	441
MoJS	5	32.31	5	30.34	4	47.48	5	28.18
Central Government Total	26	475.37	26	498.09	25	582.86	24	573.61
State Forest Department		178.36		183.12		199.84		200
State government- Soil and Conservation		46.56		50.06		61.68		62.55
State government Total		224.91		233.18		261.52		262.55
Total (Central and State)	26	700.28	52	731.27	50	844.38	48	836.16

Source: Ministry Websites, RBI (2019)

6.8

Observations

While the combined Central and state government budget for the forestry sector appears to be modest in view of the vast forest area that needs to be managed, a more holistic view of the funding support across four key sectors suggests that a significant sum of about Rs 830 bn per year is being currently provided for the management of land and ecosystems. These numbers, as compiled, maybe on the conservative side because funding on specific state schemes relevant to SLEM and the states' share in some of the Centre-sponsored schemes have not been incorporated due to paucity of data.

It can also be argued that the entire amount on the schemes other than forest and watershed may not be directly contributing to SLEM. However, these numbers give a good view of the financial resources available for interventions relevant to SLEM.

Given the context, it is also important to keep in perspective that these schemes are implemented by multiple departments across the states, i.e. Forests, Agriculture, Watershed, Soil Conservation, Irrigation, Water Resources and Rural Development. Besides, the propensity of departments working in silos is a reality, which makes an integrated approach towards the on-ground implementation difficult to achieve. The very fact that constraints on optimal use of funds are known, there is a case for a sustained effort towards integrated planning and implementation to optimize the core outcomes of the respective schemes as well as to address the issue of sustainable management of land, water and ecosystem.

CHAPTER 7



Monitoring Indicators for Institutionalizing SLEM



An effective monitoring framework is critical for measuring the outcomes of the various interventions undertaken to achieve LDN and institutionalize SLEM. A robust monitoring framework will inform and enhance land management; interim results will help to adjust interventions, and final outputs can inform future land

restoration policy. The development of suitable indicators for measuring various aspects related to land degradation is an important element of the framework.

The chapter analyses the monitoring indicators developed by the ICFRE under the SLEM project and those under the UNCCD Strategic Framework 2018-2030.

7.1 Indicators for Monitoring and Evaluation

For monitoring progress on land degradation, three biophysical indicators are used by UNCCD, i.e. land cover, land productivity and carbon stocks (UNCCD, 2013). These indicators also need to be supplemented by other indicators to provide coverage of ecosystem services, Sustainable Development of Goals (SDGs), and other national indicators. There are also advantages of using progress indicators to track implementing actions for LDN.

The UNCCD also follows the method of combining the indicators to evaluate LDN status using the "one-out, all-out" rule to remove false-positive results.

A report was developed as part of the SLEM project wherein ICFRE, through stakeholder consultation, had developed a list of indicators for UNCCD – Desertification, Land Degradation & Drought – in which 32 indicators were identified. Further work on prioritizing the indicators and on developing the Monitoring and Evaluation (M&E) Framework was undertaken.

The UNCCD reporting indicators as per the UNCCD Strategic Framework 2018-2030 were considered while finalizing the Monitoring Indicators and M&E Framework.

7.2 Analysis of SLEM Monitoring and Evaluation Framework

The M&E framework and indicators are seen at a broader level from the perspective of ease of availability of data and how likely these indicators would be to capture trends in the

parameters being tracked. The National Indicator Framework (NIF) for tracking the SDGs is now available. Many of these monitoring parameters are already taken care of in the NIF.

Table 11. Monitoring and evaluation framework developed by ICFRE under SLEM project

Strategic Objective	Sub Objective	List of the Indicator	Relation to SLEM	Outcomes/ Results Timeframe	Agency responsible
To improve the living condition of the affected population	Poverty Rate & Relative Income	The proportion of the population in the affected area living below the poverty line	Indirect	Long Term (more than 3 years)	Rural Dev Dept.
		Population dependent on agriculture and allied sector	Direct	Immediate (Annual)	Agriculture Dept.
		Out-migration of Poor Farm families	Indirect	Immediate (Annual)	Rural Development / Social Welfare Dept.
		Literacy Rate	Indirect	Medium Term (2-3 years)	Education Dept.



Strategic Objective	Sub Objective	List of the Indicator	Relation to SLEM	Outcomes/ Results Timeframe	Agency responsible
		Childhood malnutrition/food consumption/calorie intake per capita in the affected area	Indirect	Medium Term (2-3 years)	Health Dept.
	Water Availability	Water Availability per capita in the affected area	Direct	Long Term (more than 3 years)	Drinking Water Dept/ Irrigation Dept.
		Population with access to safe drinking water	Direct	Immediate (Annual)	Drinking Water Dept/ Irrigation Dept.
		Trend of ground water depletion- Below ground level	Direct	Long Term (more than 3 years)	Ground Water Dept.
To improve the condition of ecosystem	Change in Land Cover Status	Land Cover Status	Direct	Long Term (more than 5 years)	Forest/ Agriculture/ Watershed Dept.
		Area under shifting cultivation	Direct	Immediate (Annual)	Forests/ Agriculture/ Watershed Dept.
		Extent of land degradation	Direct	Immediate (Annual)	Forests/ Watershed Dept.
		Subsidies on power and irrigation and coarse grain severity of degradation	Direct	Immediate (<Annual)	Electricity / Agriculture Dept.
		Wetland and inland water reserves	Indirect	Medium Term (2-3 years)	Forest/ Irrigation Dept.
	Change in land productivity	Land productivity/yield & NPP through NDVI	Direct	Long Term (more than 5 years)	Forest/ Agriculture/ Watershed Dept.
		Climate variables (Temp, rainfall, ET, SPI)	Direct	Long Term (more than 5 years)	Forest / Revenue
		Aridity Index	Direct	Immediate (Annual)	Forest/ Agriculture/ Watershed Dept.
		Fodder availability	Direct	Immediate (Annual)	Forest/ Agriculture/ Watershed Dept.
		Crop diversification	Direct	Immediate (Annual)	Agriculture/ Watershed Dept.
		Drought & extreme event	Indirect	Long Term (more than 3 years)	Agriculture/ Revenue Dept.



Strategic Objective	Sub Objective	List of the Indicator	Relation to SLEM	Outcomes/ Results Timeframe	Agency responsible
		Water harvesting and recycling	Direct	Medium Term (2-3 years)	Forest/ Watershed/ Ground Water Dept.
To generate global benefit through effective implementation of UNCCD	Change in soil organic carbon stock/Total terrestrial carbon	Carbon stock above and below ground	Direct	Long Term (more than 5 years)	Forest Dept.
		Land under SLM	Direct	Long Term (more than 5 years)	Forest Dept.
	Trends in abundance and distribution of selected species, in particular to global wild bird index	Plant and animal genetic biodiversity	Direct	Long Term (more than 5 years)	Biodiversity Board
		Loss of key species, threat status of major species, no. of threatened species, invasive species	Direct	Long Term (more than 5 years)	Biodiversity Board/ Forest/ Agriculture Dept.
		No. of wild food species, landraces and invasive species	Direct	Long Term (more than 5 years)	Biodiversity Board/ Forest/ Agriculture Dept.
		Forest Fragmentation in Protected Areas	Direct	Medium Term (more than 2-5 years)	Forest Dept.
		No. of animal species	Direct	Long Term (more than 5 years)	Biodiversity Board/ Forest/ Agriculture Dept.
		Community conservation reserves area	Direct	Medium Term (more than 2-3 years)	Forest Dept.
		Rate of forest land conversion to other land use	Direct	Long Term (3 years)	Forest Dept.
		Regeneration of major forest species	Direct	Medium Term (2-3 years)	Forest Dept.
To mobilize resources to support the implementation of the convention through building effective partnerships between national and international actors		Integration of financial allocation on SLEM	Direct	Medium Term (> 1 year)	All line Dept.
		MoU signed with other countries w.r.t SLM/Water/ Forest Resources	Direct	Medium Term (> 1 year)	Forest Dept./ MoEFCC



Observation: From the above list, two important inferences can be drawn:

- (i) While the primary responsibility of SLEM will fall on the forest/ agriculture/ watershed and rural development Departments, and Soil and Water Conservation Department, the responsibility of measurement of parameters listed above will fall under the other than the primary implementing departments and;
- (ii) While the monitoring parameters are very pertinent when looking at SLEM holistically, implementing department/agency level indicators will also be required to be institutionalized to enable the respective agencies to monitor their progress towards

meeting SLEM targets as well as to feed into the broader parameters mentioned above.

The monitoring parameters identified would require to be cascaded to the implementation units at the District level. It would require both capacitating the implementation units in the following areas:

- (i) Identifying clear targets
- (ii) Developing data capture protocols to maintain quality and standardization
- (iii) Ensuring that proper measurement tools and equipment are available
- (iv) Supporting training of staff

7.3

Harmonization of Monitoring and Reporting with UNCCD Progress Indicators

While the country moves towards LDN while adopting and upscaling the SLEM practices, it will be desirable to harmonize the monitoring systems for various programmatic and policy interventions undertaken with the UNCCD reporting format to bring in efficiency in the reporting commitments at the international level. A breakdown of the various indicators as per the PRAIS is detailed below, with the suggested data frequency and relevant institutional stakeholders playing the key role in measuring, interpreting and disseminating the data.

The reporting format has been developed to measure the four key strategic objectives and implementation framework of the UNCCD Strategic Framework 2018-2030. The strategic objectives are listed below:

- (i) **Strategic Objective 1:** To improve the conditions of affected ecosystems
- (ii) **Strategic Objective 2:** To improve the living conditions of the affected population
- (iii) **Strategic Objective 3:** To mitigate, adapt to, and manage the effects of drought to enhance the resilience of vulnerable populations and ecosystems

- (iv) **Strategic Objective 4:** To generate global environmental benefits through effective implementation of the United Nations Convention to Combat Desertification
- (v) **Strategic Objective 5:** To mobilize substantial and additional financial and non-financial resources to support the implementation of the convention by building effective partnerships at the global and national level
- (vi) **Implementation framework:** Financial and non financial resources, policy and planning and action on ground





The details of the monitoring parameters are summarized in the table Table 12:

Table 12. Monitoring parameters for national reporting to UNCCD

UNCCD's Indicators	Assessment Type	Sub-Indicators	National Reporting Discussion Points		
			Methodology	Data Frequency (present and suggested)	Corresponding Stakeholders contributing to data reporting
STRATEGIC OBJECTIVE 1	To improve the condition of affected ecosystems (SO1-1, SO1-2, SO1-3 + SDG + Voluntary Targets)				
SO-1-1 Trends in Land Cover	Quantitative Assessment	Land Cover Area Change Matrix (km ²)	Six Classes Land Cover (Tree cover, Grassland, Wetland, Cropland, Artificial Surfaces, Other Land) with legends as described in the methodology	2 Years	NRSC, FSI, Crop Forecasting Division MoAFW
	Qualitative Assessment	Interpretation of the indicator using direct and indirect drivers hotspots/ brightspots Location details	Descriptions in the most significant negative or positive land cover changes as well as their direct and/or indirect drivers:	2 Years	NRSC, FSI, Crop Forecasting Division MoAFW
SO-1-2 Trends in land productivity or functioning of the land	Quantitative Assessment	Land Productivity dynamics land productivity dynamics areas where land conversion to a new land cover type has taken place	Six Classes (Declining, Moderate Decline, Stressed, Stable, Increasing, No Data) with legends and methodology as described using NDVI and EVI	2 Years	NRSC, FSI, Crop Forecasting Division MoAFW, SAC
	Qualitative Assessment	Interpretation of the indicator using direct and indirect drivers hotspots/ brightspots Location details	Descriptions in the most significant negative or positive land cover changes as well as their direct and/or indirect drivers:	2 Years	NRSC, FSI, Crop Forecasting Division MoAFW
SO-1-3 Trends in carbon stocks above and below ground	Quantitative Assessment	Soil organic carbon stocks in topsoil Soil Organic Carbon (SOC) stock change	Soil organic carbon of six land cover classes and change in the area	5 Years	FSI, SLUSI
	Qualitative Assessment	Interpretation of the indicator using direct and indirect drivers hotspots/ brightspots	Description of most significant negative or positive changes in organic carbon stock in the soil as well as their direct and/or indirect drivers	5 Years	FSI, SLUSI
SO-1-4 Proportion of land that is degraded over the total land area (Sustainable Development Goal indicator 15.3.1)	Quantitative Assessment	The proportion of land that is degraded over total land area	Land cover, land productivity dynamics and soil organic carbon stock using spatial extent based on the SO1-3	NA	SAC, MoEFCC



UNCCD's Indicators	Assessment Type	Sub-Indicators	National Reporting Discussion Points		
			Methodology	Data Frequency (present and suggested)	Corresponding Stakeholders contributing to data reporting
STRATEGIC OBJECTIVE 2	To improve the living conditions of affected populations (SO2-1, SO2-2 + Voluntary Targets)				
SO-2-1 Trends in the population living below the relative poverty line and/or income inequality in affected areas	Quantitative Assessment	The proportion of population below the international poverty line	Country-specific data, The World Bank's Development Research Group maintains a database that is updated annually as new survey data become available.	2 Years or lower in consultation with MOSPI/ NSSO	MoSPI/ NSSO
	Qualitative Assessment	Interpretation of the indicator using Direct and Indirect Drivers Hotspots/ brightspots	Description of most significant negative or positive changes for the given indicator in the affected rural and urban areas	2 Years or lower in consultation with MOSPI/ NSSO	MoSPI/ NSSO
SO-2-2 Trends in access to safe drinking water in affected areas	Quantitative Assessment	The proportion of the population using an improved drinking water source	Country-specific data from the different depts and analysis	Annual	Ministry of Jal Shakti
	Qualitative Assessment	Interpretation of the indicator using direct and indirect drivers hotspots/ brightspots	Description of most significant negative or positive changes in the indicators and direct and indirect drivers as well	Annual	Ministry of Jal Shakti
SO 2-3 Trends in the proportion of the population exposed to land degradation, disaggregated by sex	Quantitative Assessment	Proportion of the population exposed to land degradation, disaggregated by sex	Country-specific data from the different depts and analysis	Annual	MoSPI
STRATEGIC OBJECTIVE 3	To mitigate, adapt to, and manage the effects of drought to enhance the resilience of vulnerable populations and ecosystems (SO3-1 + Voluntary Targets)				
SO-3-1 Trends in the proportion of land under drought over the total land area	Quantitative Assessment	Proportion of land in each drought intensity class as defined by the Standardized Precipitation Index	Using SPI Methodology, Country Specific Reports	2 year	NRSC, IARI, SAC



UNCCD's Indicators	Assessment Type	Sub-Indicators	National Reporting Discussion Points		
			Methodology	Data Frequency (present and suggested)	Corresponding Stakeholders contributing to data reporting
SO 3-2 Trends in the proportion of the total population exposed to drought	Quantitative Assessment	Proportion of the population exposed to drought, disaggregated by sex.	Country-specific data	Annual	MoSPI
SO-3-3 Trends in the degree of drought vulnerability	Quantitative Assessment	Drought Vulnerability Index	Country-specific data	Annual	NRSC, SAC, IARI
STRATEGIC OBJECTIVE 4	To generate global environmental benefits through effective implementation of the United Nations Convention to Combat Desertification (SO4-1, SO4-2 + Voluntary Targets)				
SO-4-1 Trends in carbon stocks above and below ground	Quantitative Assessment	Soil organic carbon stocks in topsoil Soil Organic Carbon (SOC) stock change	Soil organic carbon of six land cover classes and change in the area	5 Years	FSI, SLUSI
SO-4-2 Trends in abundance and distribution of selected species	Quantitative Assessment	Red List Index of Species Survival	Country-specific data	Annual	MoEFCC (in consultation with IUCN, ZSI, BSI, WII)
	Qualitative Assessment	Interpretation of the indicator using Direct and Indirect Drivers Hotspots/ brightspots	Description of most significant negative or positive changes in change in trend as well as their direct and/or indirect drivers	Annual	Ministry of Jai Shakti
SO 4-3 Trends in protected area coverage of important biodiversity areas	Qualitative Assessment	Proportion of Terrestrial Key Biodiversity Areas covered by protected areas	Positive or Negative change in decline in biodiversity	Annual	MoEFCC (in consultation with IUCN, ZSI, BSI, WII)
STRATEGIC OBJECTIVE 5	To mobilize substantial and additional financial and non-financial resources to support the implementation of the convention by building effective partnerships at the global and national level (SO5-1, SO5-2, SO5-3, SO5-4)				
SO-5-1 Trends in International Bilateral and Multilateral Official Development Assistance	Quantitative Assessment	The total amount of bilateral official development assistance (ODA) committed for activities relevant to the implementation of the convention over the previous five years	Data derived from information reported to the Organization for Economic Co-operation and Development (OECD) Development Assistance Committee (DAC), based on the Rio marker classification for desertification; can be amended as appropriate.	Annual	MoEFCC, DEA



UNCCD's Indicators	Assessment Type	Sub-Indicators	National Reporting Discussion Points		
			Methodology	Data Frequency (present and suggested)	Corresponding Stakeholders contributing to data reporting
	Qualitative Assessment		Provide any complementary information you deem relevant, including trends emerging from the data as indicated above and how they relate to financing the convention's implementation, and the types of projects and/or regions or countries on which your country has focused to the greatest extent.	Annual	MoEFCC/ ICFRE
SO-5-2 Trends in domestic public resources	Qualitative Assessment	Trends in the amount of domestic desertification financing	The total amount of financing relevant for the implementation of the convention committed at the National level during the five-year period (2012 to 2016)	Annual	MoEFCC/ ICFRE
SO-5-3 Trends in number of co-financing partners	Qualitative Assessment	Trends in number of co-financing partners	No. of partners	Annual	MoEFCC/ ICFRE
SO-5-4 Resources mobilized from innovative sources of finance, including from the private sector	Qualitative Assessment	Trends in Resources mobilized from innovative sources of finance	Developing strategies to structure and access innovative finance Mapping of innovative finances by resources	Annual	MoEFCC, DEA
SO-5-5 Future Support for activities related to the implementation of the Convention	Qualitative Assessment	Trends in Resources mobilization from international public/private resources	To estimate quantitative amount of resources needed to implement the convention	Annual	MoEFCC, DEA
IMPLEMENTATION FRAMEWORK	Financial and non-financial resources, Policy and Planning and Action on Ground				
1-Financial and non-financial resources	Increasing mobilization of financial and non-financial resources for the implementation of the Convention from international and domestic, public and private sources as well as from local communities, including non-traditional funding sources and climate finance	Increasing mobilization of resources	Data compilation	Annual	MoEFCC/ ICFRE



UNCCD's Indicators	Assessment Type	Sub-Indicators	National Reporting Discussion Points		
			Methodology	Data Frequency (present and suggested)	Corresponding Stakeholders contributing to data reporting
	Taking advantage of the opportunity of using land degradation neutrality as a framework to enhance the coherence, effectiveness and multiple benefits of investments	Using LDN as a framework to increase investment	Data compilation/ coordination among key stakeholders	6 months	MoEFCC
	Improving the use of existing or innovative financial processes and institutions (such as the Global Environment Facility (GEF) or other newer funds)	Improving existing and/or innovative financial processes and institutions	Development of strategies for increasing effectiveness of funds and garner enhanced funding	6 months	MoEFCC
2-Policy and planning	Developing, implementing, revising and regularly monitoring, as appropriate, national, sub-regional and regional action programmes and/or plans as effective tools for UNCCD implementation	Action Programmes	Compilation of data on programmes implemented to restore degraded land or reduce land degradation	Quarterly	Portal for degraded land as well as for compilation of the outcomes of various programmes implemented by key Ministries, i.e. MoRD, MoAFW, MoJS
	Establishing policies and enabling environments for promoting and implementing solutions to combat desertification /land degradation and mitigate the effects of drought, including prevention, relief & recovery	Establishing policies	Implementation of the SLEM Roadmap	Annual	MoEFCC and concerned ministries
	Leveraging synergies and integrating DLDD into national plans related to the multilateral environmental agreements (MEAs), in particular, the other Rio conventions and other international commitments, as	Synergies and integrated DLDD into national plans related to other MEAs	Review of the International agreements and national policies	One time	MoEFCC



UNCCD's Indicators	Assessment Type	Sub-Indicators	National Reporting Discussion Points		
			Methodology	Data Frequency (present and suggested)	Corresponding Stakeholders contributing to data reporting
	appropriate, within their respective mandates, optimizing efficacy and eliminating duplication of efforts				
	Mainstreaming DLDD as appropriate into economic, environmental and social policies, with a view to increasing the impact and effectiveness of the implementation of the convention	Mainstreaming DLDD	Review of National policies vis a vis DLDD strategy, SLEM Roadmap	One time	MoEFCC
	Establishing National policies, measures and governance for drought preparedness and management including drought contingency plans according to the mandate of the Convention	National policies	Review Drought Management policies	One time	MoAFW, MoEFCC, MoJS, MoRD
	Implementing sustainable land management practices	SLM practices	Review of relevant programme guidelines/monitoring respective guidelines	One time	MoAFW, MoEFCC, MoJS, MoRD
	Implementing restoration and rehabilitation practices to assist with the recovery of Ecosystem functions and services	Restoration and rehabilitation	Committing resources, capacity development, scientific inputs for land management, community involvement	Quarterly	All ministries/ departments concerned with the implementation of SLM activities, compilation of outcomes at a central level, periodic review
3-Action on the ground	Developing and operationalizing drought risk management, monitoring and early warning systems and safety net programmes	Drought risk management and early warning systems	Implementation of Drought Management Plan	Annual	MoAFW, MoEFCC, MoJS, MoRD



UNCCD's Indicators	Assessment Type	Sub-Indicators	National Reporting Discussion Points		
			Methodology	Data Frequency (present and suggested)	Corresponding Stakeholders contributing to data reporting
	Promoting alternative livelihoods	Alternative livelihoods	Programme implementation to increase the resilience by disaster and drought-proofing livelihoods	Quarterly	MoRD, MoAFW, MoEFCC
	Establishing systems for sharing information and knowledge and facilitating networking on best practices and approaches to drought management	Establishing Knowledge sharing systems	Common portal for knowledge sharing	Annual	MoEFCC/ ICFRE

7.4

Operationalizing the Monitoring Framework

Operationalization of the monitoring framework and reporting under the UNCCD Strategic Framework 2018-2030 would require some key considerations as mentioned below:

Identification of Primary Stakeholders for Reporting – Since the indicators to be monitored as per the UNCCD Strategic Framework 2018-2030 are being handled across various ministries and departments of the Government of India, namely MoEFCC, MoRD, MoJS, MoAFW and subordinate organizations under them. This would also include orientation of the stakeholders on the reporting parameters and alignment of mutual understanding of the same.

Definition of Hotspots/ Brightspots: The UNCCD Strategic Framework 2018-2030 has reporting parameters on hotspots and brightspots across various dimensions related to land management, i.e. land cover area, land productivity dynamics, soil organic carbon and both above ground and below ground. The definition of hotspots and brightspots has to be decided by the nodal reporting authority, i.e., MoEFCC, in consultation with the other stakeholders for maintaining uniformity in understanding and reporting.

Fixing Targets at National and Sub-National Levels: While the UNCCD Strategic Framework 2018-2030 is structured around reporting on the key parameters, India already has identified key areas related to SLEM, which are also covered in the monitoring indicators under the SDGs. It will be important to divide the targets with clear responsibility to various stakeholders and cascade them to subordinate implementation units to improve transparency and outcomes.

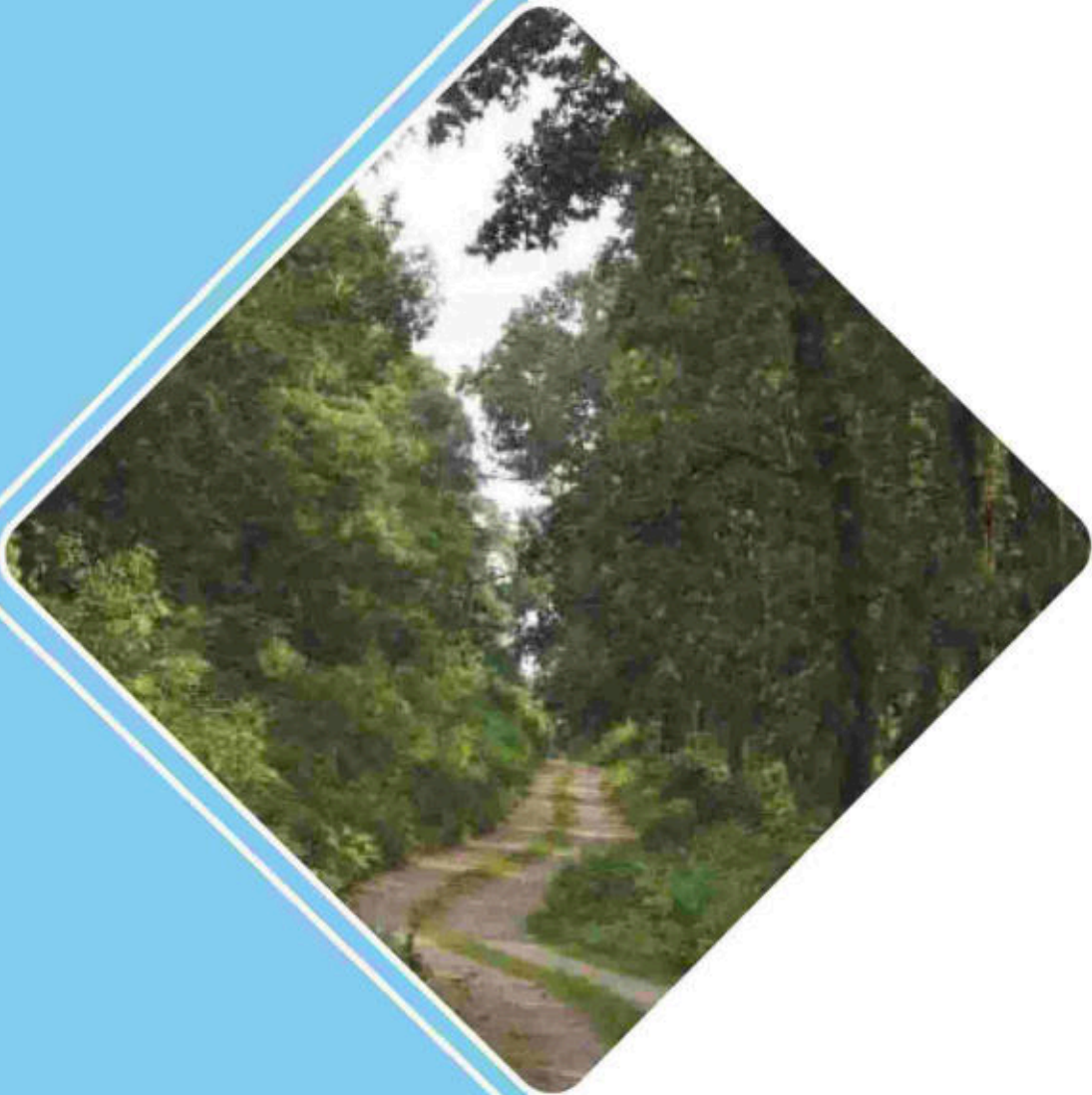
Compilation of Data Related to the Restoration of Degraded Land: Activities on land that affect land and contribute to LDN are carried out under various government programmes and schemes by various ministries/departments of the Government India and state governments. It will be critical to consolidate the coverage of area under LDN taken up under various schemes and remove duplication and serve as a planning tool.

Further, two important aspects regarding the implementation of SLEM for achieving LDN is important to mention. They are listed below:

Landscape Units for Measurement: The land units taken up for interventions under LDN should be stratified and mapped based on land types and ecosystem features. "Like for like" comparison of land types is important for assessing and managing counterbalancing between gains and losses in each class of land. During stratification, the primary source of variability in both long-term land potential and land cover or use should be considered. It can be used to support integrated land-use decisions in conjunction with other assessments as well as for monitoring purposes.

Baselines: A baseline at the identified landscape level is an essential requirement for the monitoring framework. The baseline should cover all indicators in the monitoring framework and should be of reasonable quality as they would be used to assess deviations, both negative and positive, in the land degradation status of the landscape in question. From the aspect of LDN, the baseline becomes the target even though LDN is the minimum objective.

CHAPTER 8



SLEM and Land Degradation Neutrality



The concept of Land Degradation Neutrality was agreed in October 2015, by the UNCCD country Parties. This idea is enshrined in the SDGs 15.3 "by 2030, combat desertification, and restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land-degradation neutral world". Through the LDN Target Setting Programme, the Global Mechanism (GM) and the secretariat of the UNCCD, in collaboration with multiple international partners, are supporting interested countries with their National LDN target setting process, including setting National baselines, targets and associated measures to achieve LDN. Till date, over 129 countries have committed to setting LDN targets. More than 100 countries have

already set their targets, and many have secured high-level government commitment to achieve LDN.

Land Degradation Neutrality (LDN) is defined as a state whereby the amount and quality of land resources, necessary to support ecosystem functions and services and enhance food security, remains stable or increases within specified temporal and spatial scales and ecosystems (UNCCD).⁵⁹ It is a unique approach that counterbalances the expected loss of productive land with the recovery of degraded areas. It strategically places the measures to conserve, sustainably manage and restore land in the context of land use planning.

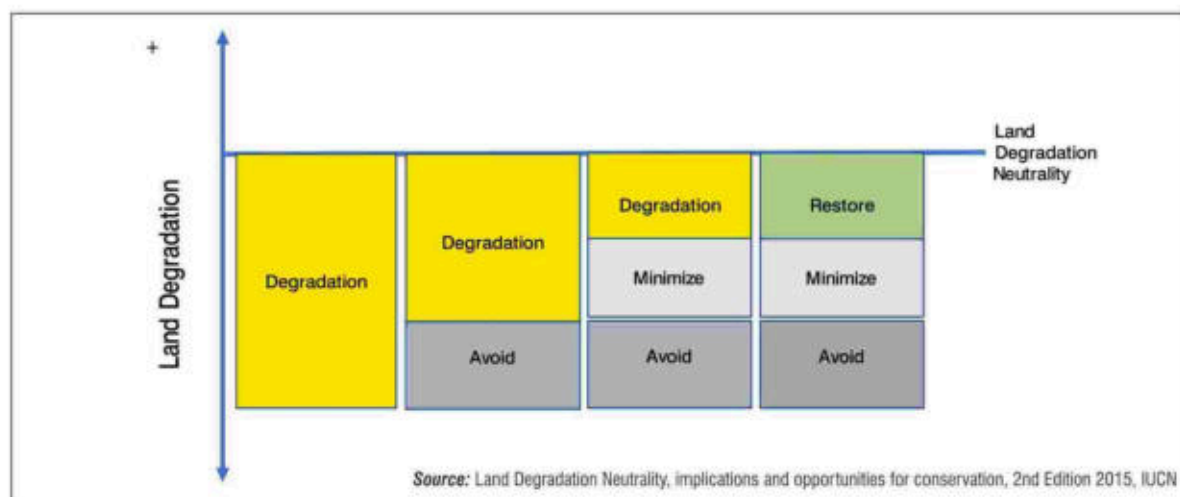


Figure 21. Mitigation Hierarchy and LDN

Policies and programmes to halt and reverse land degradation have long suffered from the absence of a clear overarching goal and quantitative time-bound targets to guide action and make measurable progress. LDN aims to balance anticipated losses in land-based natural capital and associated ecosystem functions and services with measures that produce alternative gains through approaches such as land restoration and sustainable land management.

LDN means securing enough healthy and productive natural resources by avoiding degradation whenever possible and

restoring land that has already been degraded. At its core are better land use planning and better land management practices that will improve economic, social and ecological sustainability for present and future generations.

Thus, central to LDN is the principle of Sustainable Land and Ecosystem Management and LDN can be achieved through implementation of SLEM practices.

⁵⁹ <https://www.unccd.int/actions/achieving-land-degradation-neutrality> and <https://knowledge.unccd.int/topics/land-degradation-neutrality>



8.1 Land Degradation Neutrality Target Setting Building Blocks

The Land Degradation Neutrality Target Setting Programme (LDN TSP) is assisting countries in making the LDN concept a reality by 2030, by providing practical tools and guidance for the establishment of voluntary LDN targets, accelerating the implementation of transformative programmes and projects, with positive changes.

LDN Target Setting: The Building Blocks: Four building blocks form the basis of the LDN target-setting process, developed on the scientific guidance provided by the UNCCD's Science-Policy Interface and feedback received from countries and stakeholders. They build on the early lessons from the LDN Target Setting Pilot Project with 14 pioneer countries, representing all regions. The building blocks are:

1. **Leveraging LDN:** LDN target setting is not a stand-alone process but provides opportunities for coordination across ministries and sectors involved in land management. By finding common answers to: Why does LDN matter? What should we leverage? Who should be engaged? Countries can succeed in leveraging LDN.
2. **Assessing LDN:** Assessing the current state of land degradation and its drivers is the basis for setting LDN

targets, making informed decisions on what action to take, and tracking progress.

3. Setting LDN Targets and Associated Measures: LDN targets define a country's ambitions in terms of combatting land degradation. LDN measures comprise a whole range of interventions to avoid, reduce or reverse land degradation.

4. Achieving LDN: An enabling environment is a prerequisite for achieving LDN. It makes integrating the LDN concept into National policies easier and identifying transformative LDN programmes and projects possible.

The LDN target setting thus involves collaboration and concerted actions by various agencies engaged in management of land resources backed by data and an enabling environment, which mirrors the strategy for implementation of SLEM also.

While the LDN target for the country has been set, contributions of various Ministries/ Departments are an activity which is required to be completed to expedite planning and committing of resources.

8.2 Land Degradation Neutrality in the Indian Context

97.85 mha area of the country (29.77% of total geographic area) is undergoing degradation (SAC, 2021). This has significant implications for ensuring India's food security, land resilience and climate mitigation. The costs imposed by this level of land degradation are large, conservatively estimated to account for at least 2.5% of India's GDP in 2014/15 and about 15.9% of the Gross Value Added (GVA) from the agriculture, forestry and fishing sectors (TERI, 2018). Almost 82% of this cost is due to degradation while land use change accounts for only 18% of the total, underlining the need for a twin focus on restoring degraded ecosystems and preventing further deterioration.

Land degradation has been reported in all the major land use classes, including agriculture, forests, wastelands and wetlands.

As part of the LDN target, India has committed to restore 26 million hectares of degraded land by 2030. This implies that there is an increase in commitment from 21 Mha to 26 Mha from India's earlier Bonn Challenge target announced in 2015 (IUCN, 2018) As per the Bonn Challenge target, India was to restore 13 Mha by 2020 and a further 8 Mha by 2030.

Before we further analyse the issue, it would be important to look at the data regarding land degradation in India.



8.3 Status of Land Degradation in India

The status of land degradation is primarily borne out by the periodic assessments done by agencies like SAC, NRSC

and FSI. A brief about the assessment conducted by these agencies is given in the following sections.

8.3.1 Extent of Wasteland in India

The Department of land resources in collaboration with National Remote Sensing Centre (NRSC), Department of Space has published Wasteland Atlas of India in 2000, 2005, 2010 and 2011 and 2019. The wasteland atlas was analysed to identify the relevant categories of wastelands which can be treated and reclaimed. The following emerged from the analysis:

- Spatial extent of wastelands in India is 55.76 Mha (16.96 per cent of geographical area of the country i.e. 328.72 Mha) for the year 2015-16 as compared to 56.60 Mha (17.21 per cent) in the year 2008-09.
- During this period 2008-09 to 2015-16, a total area of 1.45 Mha of wastelands got converted into non-wasteland categories.

As per the Wasteland Development Board wasteland has been defined as *"degraded land that can be brought under vegetative cover with reasonable effort and which is currently underutilised and land which is deteriorating for*

lack of appropriate water and soil management or on account of natural causes". Central to wasteland development has been bringing wasteland into productive use or stop its further degradation.

If the categories of wasteland are looked at closely, not all them may be viable for restoration. With continued pressure on the land for satisfying needs of the people, most of the land which could be used for some productive activities with reasonable effort and investment have already been taken. Therefore, most of the land categorized as wasteland would require a higher level of investment, both to stop further degradation as well to bring them into some economic use. Analysis of the wasteland data suggests about 54% of the land categorized as wasteland in India i.e. 30 Mha area can be restored through different treatments. The categories of wasteland which have potential for reclamation/restoration is presented in the table below.

Table 13. Analysis of wasteland categories

S. No.	Land Category	Total Wastelands (Mha)			Potential for Reclamation/ Restoration
		2008-09	2015-16	Change	
1	Gullied and/or ravinous land (Medium)	0.66	0.65	-0.01	High
2	Gullied and/or ravinous land (Deep)	0.31	0.31	0.00	Moderate
3	Land with Dense Scrub	8.06	7.40	-0.67	High
4	Land with Open Scrub	9.73	9.96	0.23	High
5	Waterlogged and Marshy land (Permanent)	0.18	0.16	-0.02	No*
6	Waterlogged and Marshy land (Seasonal)	0.63	0.52	-0.11	No*
7	Land affected by salinity/alkalinity (Medium)	0.52	0.47	-0.04	Low
8	Land affected by salinity/alkalinity (Strong)	0.16	0.16	0.00	Low
9	Shifting Cultivation - Current Jhum	0.44	0.39	-0.05	Moderate



10	Shifting Cultivation - Abandoned Jhum	0.41	0.46	0.05	High
11	Underutilised/ degraded forest (Scrub dominant)	8.70	8.64	-0.05	High
12	Underutilised/ degraded forest (Agriculture)	2.08	2.17	0.09	High
13	Degraded pastures/grazing land	0.69	0.65	-0.04	High
14	Degraded land under plantation crop	0.03	0.02	0.00	High
15	Sands Riverine	0.32	0.31	0.00	No*
16	Sands Coastal	0.07	0.07	0.00	No*
17	Sands-Desertic	0.83	0.82	-0.01	No*
18	Sands-Semis tab - Stab > 40 m	0.95	0.93	-0.01	Moderate
19	Sands-Semis tab -Stab 15 – 40 m	1.30	1.18	-0.12	Moderate
20	Mining Wastelands	0.18	0.23	0.04	High
21	Industrial Wastelands	0.02	0.03	0.01	High
22	Barren Rocky/Stony waste	9.22	9.45	0.23	No*
23	Snow covered/Glacial area	11.13	10.79	-0.34	No*
	Total	56.61	55.77	-0.84	

55 Mha of degraded land has potential for reclamation.

Source: Wasteland Map of India 2015-16 (NRSC, 2019)

Note: "Potential for reclamation/ restoration" is being used in the present context purely from the perspective of direct benefits to humans in terms of the potential of the land to produce economic goods. However, each of these categories of land, including those mentioned as having no potential for reclamation/ restoration do serve very important ecological functions which are important in maintaining hydrology, biodiversity and resilience to climate variations.

Table 14. Summary of potential for improvement potential

Potential for Improvement	Total Area in Million Ha
High	30.21
Medium	2.81
Low	0.63
No Potential	22.12
Total	55.77

Source: Wasteland Map of India 2015-16 (NRSC, 2019)

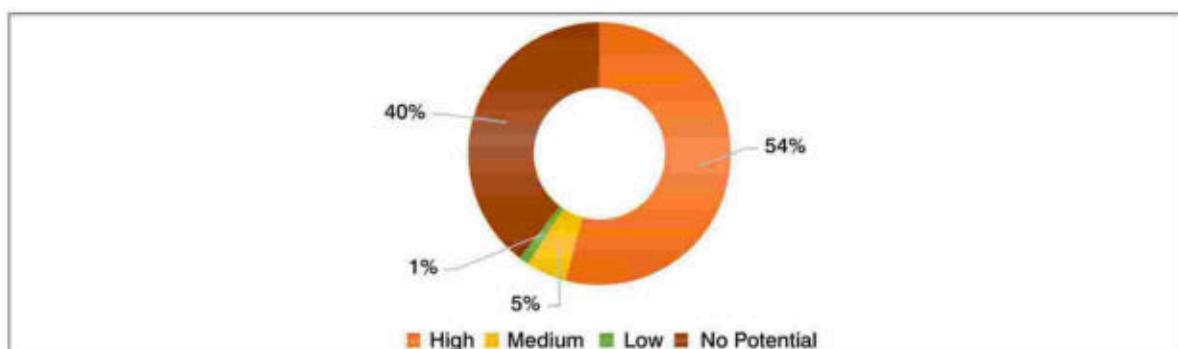


Figure 22. Potential for Treating Wasteland Area as per 2015-16 Classification of Wasteland Atlas data



The State wise breakup of the 30 Mha wasteland area in different wasteland category are given as below:

Table 15. Analysis of state wise potential for wasteland restoration

S. No.	State	Year	Land Category Code (Wasteland Class- Area in Sq. Km)										Total
			1	3	4	10	11	12	13	14	20	21	
1	Andhra Pradesh	2015-16	116	6291	4600	2	8174	732	97	13	3	3	20031
2	Arunachal Pradesh		--	634	1818	1204	17	15	254	--	--	--	3941
3	Assam		--	2093	1993	82	1761	2116	21	--	86	6	8159
4	Bihar		67	421	1629	--	1103	53	4	--	11	8	3295
5	Chhattisgarh		65	471	2407	0.16	4171	2867	0.38	18	108	37	10144
6	Delhi		--	6	69	--	1	--	--	--	0.71	--	76
7	Goa		--	98	250	--	64	6	--	0.50	34	0.39	451
8	Gujarat		218	9168	8427	--	2292	471	17	60	98	22	20773
9	Haryana		--	152	659	--	84	35	590	34	2	1	1557
10	Himachal Pradesh		64	930	4036	--	210	19	633	--	11	4	5906
11	Jammu & Kashmir		898	912	3314	--	7023	2936	191	41	4	4	15324
12	Jharkhand		270	2097	2400	--	5073	1208	--	6	317	23	11394
13	Karnataka		80	1427	3571	--	4928	1194	--	6	413	7	11626
14	Kerala		--	325	616	--	584	1	379	0.16	65	0.31	1970
15	Madhya Pradesh		1472	6534	14188	--	13321	3368	13	--	321	61	39277
16	Maharashtra		502	10156	12377	--	9913	1205	148	22	41	9	34371
17	Manipur		1	1211	3145	299	486	0.21	0.37	--	--	--	5142
18	Meghalaya		--	510	2612	423	65	0	--	--	54	--	3664
19	Mizoram		--	1587	467	1011	544	--	--	--	--	--	3609
20	Nagaland		--	1316	2078	681	0.01	2	--	--	5	--	4081
21	Odisha		594	4974	3301	809	5307	1613	--	0.06	17	40	16654
22	Punjab		22	86	104	--	73	0.57	--	--	0.19	--	285
23	Rajasthan		981	16936	17201	--	10792	330	3181	0.81	13	16	49451
24	Sikkim		--	--	16	--	92	--	3	--	--	--	111
25	Tamil Nadu		183	1944	2214	--	2216	71	230	25	357	19	7258
26	Telangana		128	2400	2683	--	4453	3134	28	2	194	10	13031
27	Tripura		0.48	205	215	64	372	16	--	6	--	0.42	877
28	Uttarakhand		--	308	801	--	716	44	662	2	5	--	2538
29	Uttar Pradesh		805	470	1625	--	1958	223	0.59	9	51	23	5163
30	West Bengal		17	307	769	--	366	13	--	4	45	24	1545
31	Union Territories		--	5	17	--	252	21	--	--	0.42	0.27	295
India Total			6484	73972	99602	4575	86411	21691	6450	249	2256	317	302008

Source: Wasteland Map of India 2015-16 (NRSC, 2019)



8.3.2 Desertification and Land Degradation in India

MoEFCC commissioned a study with ISRO's Space Applications Centre (SAC) and released a detailed report on the desertification and degradation status of India in the form of Desertification & Land degradation Atlas of India (SAC, 2021). As per the report, more than a quarter of the total geographic area (TGA) i.e. 97.85 million hectares or 29.77% of TGA is undergoing various stages of degradation. It also revealed that around 23.79% (2018-19), 23.63% (2011-13) and 23.34% (2003-05) of the area undergoing desertification/land degradation with respect to TGA of the country is contributed by Rajasthan, Maharashtra, Gujarat, Karnataka, Ladakh UT, Jharkhand, Odisha, Madhya Pradesh and Telangana (in descending

order). With respect to the geographical area of the individual States, the report stated that Jharkhand, Rajasthan, Delhi, Gujarat, and Goa showed more than 50 % of their area being under desertification/land degradation. This data indicates that tackling the issue of land desertification is becoming critical in these States.

The Atlas also provided details of major cause of the land degradation. As per the report water erosion contributes to around 37% of the total degradation while vegetation degradation is causing the 30% land degradation. Wind erosion, salinity and frost shattering comes after that with total contribution of around 18%, 4% and 3% respectively.

Table 16. Process wise changes in desertification/ land degradation status

Process of Desertification/ Land Degradation	2018-19		2011-13		2003-05		Change (Mha)	
	Area (Mha)	Area (%)	Area (Mha)	Area (%)	Area (Mha)	Area (%)	(2018-19) - (2011-13)	(2011-13) - (2003-05)
Vegetation Degradation	30.07	9.15	29.30	8.91	28.28	8.60	1.01	1.01
Water Erosion	36.20	11.01	36.10	10.98	35.61	10.83	0.10	0.49
Wind Erosion	17.94	5.46	18.23	5.55	18.35	5.58	-0.29	-0.11
Salinity	3.64	1.11	3.67	1.12	4.01	1.22	-0.03	-0.32
Water Logging	0.81	0.25	0.65	0.20	0.60	0.18	0.15	0.05
Frost Shattering	3.47	1.05	3.34	1.02	3.11	0.95	0.12	0.23
Mass Movement	0.94	0.29	0.93	0.28	0.84	0.26	0.01	0.08
Manmade	0.64	0.19	0.41	0.12	0.37	0.11	0.23	0.04
Barren/Rocky	1.87	0.57	1.89	0.57	1.88	0.57	-0.02	0.00
Settlement	2.27	0.69	1.88	0.57	1.48	0.45	0.39	0.40
Total Area under Desertification	97.85	29.77	96.40	29.32	94.53	28.76	1.45	1.87
No Apparent Degradation	225.06	68.46	226.73	68.97	228.68	69.57	-1.67	-1.95
Total Geographical Area (Mha)	328.72							

Source: SAC, 2021

8.3.3 Degradation of Forest Land

Forest cover in the country is mapped in four density classes, Very Dense, Moderate, Open and Scrub. The

area under various classes as per the ISFR 2021 (FSI, 2021) is as follows:



Table 17. Areas under various classes of forests

Density Class	Area (sq. km) 2021	Area (sq. km) 2019	Difference in 2021 over 2019	Percentage of geographic area (2021)
Very Dense Forest (VDF)	99,779	99,278	+ 501	3.03
Moderately Dense Forest (MDF)	3,06,890	3,08,472	- 1582	9.34
Open Forest (OF)	3,07,120	3,04,499	+ 2621	9.34
Total	713,789	7,12,249	+1540	21.71

Analysis of the change in density classes using the change matrix shows that 97,770 sq km of VDF in 2019 (out of 99278 sq km assessed in 2019) has remained VDF in 2021

whereas net 714 sq km of MDF has moved to the VDF class. 1164 sq km and 1712 sq km of non-forest has been added to Open Forest and Scrub respectively.

Table 18. Change matrix-I for forest density classes

S. No.	Class	Area in Sq. Km					Total ISFR 2019
		2021 Assessment					
		VDF	MDF	OF	Scrub	NF	
1	Very Dense Forest (VDF)	97,770	982	348	28	150	99,278
2	Moderately Dense Forest (MDF)	1,696	3,02,216	2,736	331	1,493	3,08,472
3	Open Forest (OF)	245	2,939	2,94,200	1,491	5,624	3,04,499
4	Scrub	31	241	3,048	40,977	2,000	46,297
5	Non-Forest (NF)	37	512	6,788	3,712	25,17,874	25,28,923
6	Total ISFR 2021	99,779	3,06,890	3,07,120	46,539	25,27,141	32,87,469
7	Net Change	501	-1,582	2,621	242	-1,782	

Table 19. Change matrix-II for forest density classes

S. No.	Class	Area in sq. km					ISFR 2021
		VDF	MDF	OF	Scrub	NF	
1	Very Dense Forest	99,278	+714	-103	+3	-113	99,779
2	Moderately Dense Forest	-714	308,472	+203	-90	-981	306,890
3	Open Forest	+103	-203	304,499	+1557	+1,164	307,120
4	Scrub	-3	+90	-1,557	46,297	+1,172	46,539
5	Non-Forest	+113	+981	-1,164	-1,712	25,28,923	25,27,141

Information from the change matrix does not show the degradation that might be occurring within the density classes. For this change to be evident, the difference within 0.2 pts of density within a density classes would be a useful

information. Such information could be of immense importance while choosing sites for afforestation under normal forestry schemes as well as CAMPA.



8.3.4 Land Affected by Salinity in India

About 6.73 Mha of land in India is affected by salinity of various degrees. Just five states, Gujarat, Uttar Pradesh, Maharashtra, West Bengal and Rajasthan account for 75 % of the salinity affected lands. Soil salinity characterized by Electrical Conductivity (EC) values at 25 degrees above 4

dS m⁻¹ render them unsuitable to grow majority of the food crops. In sodic soils excess exchangeable sodium percentage (ESP >15) adversely affects the growth and development in most crop plants.

Table 20. Extent of salinity and sodicity affected lands in India

State	Saline soil (ha)	Sodic Soil (ha)	Total (ha)	Percentage of geographical area
Andhra Pradesh	77,598	196,609	274,207	1.7%
Andaman & Nicobar Islands	77,000	-	77,000	9.3%
Bihar	47,301	105,852	1,53,153	1.6%
Gujarat	1,680,570	541,430	2,222,000	11.3%
Haryana	49,157	183,399	232,556	5.3%
Karnataka	1,893	148,136	150,029	0.8%
Kerala	20,000	-	20,000	0.5%
Maharashtra	184,089	422,670	606,759	2.0%
Madhya Pradesh	-	139,720	139,720	0.5%
Odisha	147,138	-	147,138	0.9%
Punjab	-	151,717	151,717	3.0%
Rajasthan	195,571	179,371	374,942	1.1%
Tamil Nadu	13,231	354,784	368,015	2.8%
Uttar Pradesh	21,989	1,346,971	1,368,960	5.7%
West Bengal	4,1,272	-	441,272	5.0%
Total	2,956,809	3,770,659	6,727,468	

Salinity affected area is expected to increase from current 6.7Mha to 20 Mha by 2050.

There are estimates that salinity affected area could increase three times to 20 Mha by 2050, significantly affecting water availability also (CSSRI, 2014). The 2016 assessment of Haryana suggests that the salinity affected area in the state has increased to 0.31 Mha compared to 0.23 Mha in 1996 which points to increasing trend of salinity affected areas.

Some of the main reasons for soil salinity apart from natural physical and chemical weathers of rocks and primary minerals are:

- (i) Irrigation with saline water
- (ii) Excessive leaching
- (iii) Ingress of sea water in coastal regions
- (iv) Waterlogging and seepage from canals

- (v) Faulty irrigation practices leading to localized concentration of salts

The ICAR institutes have been working on addressing soil salinity in the country. The main accomplishments in this regard have been delineation of salt affected area at 1:250,000 and 1:50,000 scale, reclamation and management of saline and sodic soils, phytoremediation of salt affected areas, deployment of sub-surface and bio drainage for waterlogged areas, saline aquaculture etc.

However future threats of increase in saline affected area continues due to waterlogging and secondary salinity in irrigation command areas, resodification and resalination of amended soils, water scarcity and salinity nexus, and diminishing supply of chemical amendments.



8.3.5 Status of Wetlands

Wetlands are important ecological systems, which serve important ecological and hydrological functions. However, challenges related to declining area and water quality in wetlands raises questions on sustainability of many of the wetlands. The problem of deteriorating water quality is particularly alarming for the smaller water bodies. Majority of wetlands fall in the category of common property resource with open access and subject to extractive use.

National Wetland Atlas 2011, prepared by SAC (SAC, 2011), is the latest inventory on Indian wetlands. According to the report, a total of 201,503 wetlands were identified and mapped on 1:50,000 scale. In addition, 555,557 wetlands (of area <2.25 ha, which is smaller than minimum measurable unit) were identified. The area covered by 757,060 wetlands is 15.3 Mha (about 4.7% of the total geographical area). As is obvious, the area spread under water varies greatly with season. Inland wetlands have water spread varying from 7.4

Mha in post monsoon to 4.8 Mha in pre-monsoon. The area spread for coastal wetland similarly varies between 1.2 Mha and 1 Mha. The changing water spread areas also define the ecology and limnology of the wetlands.

The area under aquatic vegetation in the wetlands i.e. lakes, riverine wetlands, ox-bow lakes, tanks and reservoirs put together also changes from 1.32 Mha in pre monsoon to 2.06 Mha post monsoon.

FSI has also reported the area of wetland within recorded forest area/ green wash area. As per the ISFR 2019, there are 62,466 wetlands within forest area covering 3.83% of the geographic area of the country.

However not subsequent nationwide study on extent of wetlands is available after the 2011 study.

The last Wetland mapping was done in 2011. Wetland survey is required to be carried out periodically to track their health.

8.4

Analysis of Factors of Land Degradation in India

The drivers of land degradation vary in causes and intensity across various land uses. Typically, the causes of land degradation of agriculture land are overuse of water, fertilizers or other inputs, unsuitable crops as per land capability and faulty land management practices leading to loss of top soil and leaching of nutrients. The key reasons for degradation of forest land is removal of vegetation cover, fire and invasive species. Loss of certain species in forest landscapes are also causes of change in quality of forests. The main drivers of degradation of wasteland includes removal of vegetation for firewood, or fodder, removal of soil, stones, and quarries, converting unsuitable

land into subsistence agriculture, etc. which accelerates soil and nutrient loss for wastelands. Many of these drivers are interconnected in a complex web of cause and effect and often are required to be viewed holistically for finding appropriate solutions.

Land degradation can be also be accounted for in two dimensions: first is the degradation of land within a particular land use, and second is a change in land use which is less efficient or optimal. For example, degradation of forests would qualify in the first dimension, whereas change of forest land into agriculture would qualify in the second dimension.

8.4.1 Drivers of Forest Degradation

Forest degradation means a reduced capacity of forests to produce goods and services. Degraded forests are becoming the predominant forest types and are gradually having to provide the productive and environmental functions of primary, old growth forests (ITTO, 2002).

Most of the common human induced drivers of forest change can be bracketed in two categories – Planned and unplanned. The planned drivers would include infrastructure and other development works like road and railway construction, mining activities, hydro-electric



power, dams and irrigation projects, industrial development, planned expansion of cities and town; unplanned drivers would include unauthorized, unplanned, or unsustainable extractions of forest resources not covered in official management plans like encroachment of forest land for agriculture and housing, illegal felling of timber, firewood, small timber, and NTFP extraction, Livestock grazing, fodder collection, illegal mining and quarry operations etc. (MPFD, 2017). Many times, after effect of such activities lead to changes in the soil moisture and sub soil water regime, infestation of invasive species, fire and pests which supports further degradation.

Encroachment of forest land is a particularly severe threat to forests. As per the information from MoEFCC, 1.28 Mha of forest land is under encroachment⁶⁰. In addition, individual forest right under FRA have been finalized over 1.7 Mha of forest land which is about 46% of the claims. The data raises the apprehension that most likely an area similar to the extent of forest land for which titles have not been distributed is under some form of non-forest use by forest dwellers.

Some interesting insights from the primary data collected during the USAID REDD+ project in Hoshangabad shows that 73% of household within 0-5 km of forests in the project area are dependent on fuelwood for cooking and heating purposes and 88.8% of the fuelwood is sourced from forests. 78.3% of households let out their cattle for free grazing and incidence of stall feeding is as low as 2.3%. About 24% households collect MFP from forests. At an aggregate level such dependencies point to huge extractions from forests beyond its carrying capacity which is driving changes in quality and extent of forests.

Almost 3.4 Mha (4.4% of RFA) of forest land is under encroachment.

Studies suggest that in secondary forests, it takes about one or two centuries for the amount of biomass to reach that of the primary forest through natural succession. The pace of succession would depend on many factors like extent of disturbance, site quality, availability of seed and seed dispersers. Some of the characteristics of degraded forests are typically eroded or nutrient deficient soil, hydrologic instability, reduced productivity and low biological diversity. Persistent physical, chemical and biological barriers continue to prevent natural succession. In some cases, there

is a risk of ecological threshold being crossed due to the intensity, scale and frequency of disturbance which might mean that recovery would be very or impossible.

There has been no mapping of degradation within demarcated forests, however it is estimated to be 30% of the total forest area.

In the Indian context, while the extent of forest cover based on canopy density classes is known, the extent of degraded forests on the ground and value of this resource is not known. This "invisibility" of the degraded forests prevents adequate response in terms of policy focus and resources on tackling the issue. The primary intervention to address degraded forest land is to remove or reduce the factors causing degradation and allow the land to rest. This will also require involvement of communities towards forest restoration, for which they might not be willing to contribute because this is the goal they do not share, or they fear that usufructs from the forest land will stop or reduce. There could also be the need to address conflict within the community which may be leading to resource degradation. Any attempt towards restoration would require an equitable distribution of cost and benefits for outcomes to be sustainable. Also, ways have to be found to cushion the cost for the community in the short in intermediate term. In addition, steady flow of economic and social benefits to the stakeholders whose livelihoods depend on these lands needs to be ensured during the restoration phase.

To manage these drivers, appropriate approaches like policy interventions, management options and site-specific mitigation measures are required. Drivers arising out of local people's dependence on the adjoining forest areas to meet their livelihood and subsistence needs of firewood, grazing, fodder, and food supplements will require weaning away of local communities for such practices which has to be accomplished with require sizable investment in providing alternatives options for the period when such dependence reduces as well as forests are able to recoup.

From the perspective of LDN, it is clear that proper mitigation measures would be required over the next 10 years along with plantation or afforestation activities for the efforts to have anticipated impact. In this context the role of forest fringe villages become an interest aspect for discussion,

⁶⁰ Reply to Parliament; Lok Sabha Unstarred Question no 5531 replied on 26.07.219



8.4.2 Shortage of Fodder

As per the 20th Livestock Census, the total livestock population in India is 535.78 million, which is an increase of 4.6 per cent over the previous Census in 2012 (DAHD, 2019). Out of which the bovine population is 302.79 million.

National Institute of Animal Nutrition and Physiology (NIANP) has estimated that in 2015, as against the requirement of 491 Million Tonnes of dry fodder, the availability was 387 Million Tonnes. Similar against a requirement of 840 Million Tonnes of green fodder, the availability was 619 Million Tonnes. This deficit in availability of dry fodder and green fodder works out to 21 per cent and 26 per cent respectively. The deficit is likely to increase to 23 per cent, 40 per cent by 2025.

The deficit is exacerbated due to declining grazing land and pressure on agriculture land to produce food grain, oilseeds and pulses. While the cattle population in the country is increasing as also is the dairy output, a lot of the pressure of grazing is absorbed by forests resulting in reduced regeneration, failing plantations and increasing degradation of such lands. In many communities living adjacent to forest areas, this is also a reason for severe conflict with the local forest administration. ICFRE (ICFRE, 2001) estimates suggest that India's forest support 270 million cattle for grazing against its carrying capacity of 30 million. The incidence of grazing is estimated to be affecting 78 per cent of the India's forests of which 18 per cent are highly affected with remaining 31 per cent and 29 per cent medium and low

respectively (World Bank, 2006). The large livestock population also results in huge collection of tree fodder, which affects the forest quality adversely. This explains the pressure on India's forest from livestock sector and its contribution to the state of degradation of forests in human dominated landscapes of the country.

Other than the reasons of non-availability of grazing land, or land to grow fodder crops, the more critical aspect is that fodder availability as a subject is not being dealt with in the same manner as is agriculture production. The treatment of the subject is fragmented, wherein Department of Animal Husbandry is mostly concerned about livestock while the Department of Agriculture has not taken up the issue of development or management of grassland in a concerted manner. Development of fodder was a component of RKVY but has had limited success. Accelerated Fodder Development Programme was implemented RKVY in 8 States 2011-12 to 2013-14. In the year 2011-12 and 2012-13 about 13.7 lakh ha was covered with an expenditure of Rs. 428 crore. At the state level, grasslands and gauchars are spread across the domain of Revenue, Panchayats and Forest Departments. There is a clear absence of an integrated programme for grassland and fodder development.

The deficit in green and dry fodder in the country is 21% and 26% respectively, putting immense pressure on forest and common lands.

8.4.3 Role of Forest Fringe Villages and LDN

As per the ISFR 2019, it is estimated that around 300 million people i.e. about 22 per cent of the population are living in forest fringe villages (FFV) in India (FSI, 2019). FFV in this study has been defined as those villages which fall in 5 km from the periphery of recorded forest area. At an aggregate

scale, total 85 Million Tonnes of firewood, 1,053 Million Tonnes of fodder, 5.8 Million cum of small timber, and 1.8 Million tonnes of bamboo is removed from forests by people residing in the FFVs.

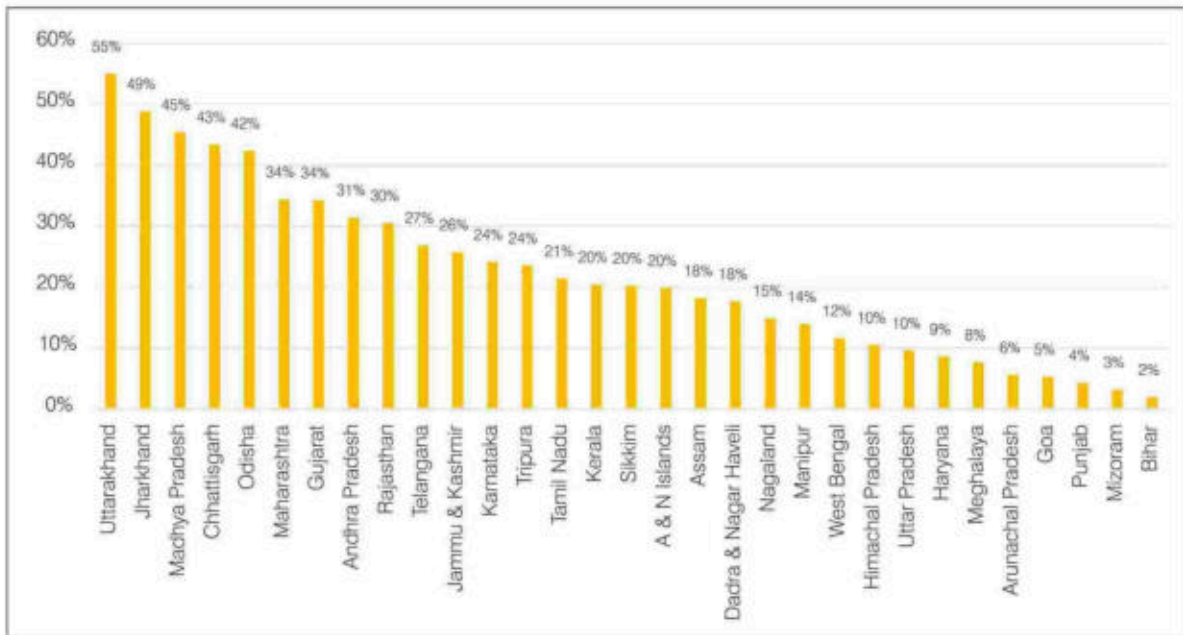


Figure 22. Population residing in FFV vs total projection in 2019

The dependence on forests is not similar in all the states as is evident from the chart above. States like Uttarakhand, Jharkhand, Madhya Pradesh, Chhattisgarh and Odisha have over 40 percent of their population residing in FFV. It is also obvious therefore that the pressure on forests would be higher in such states.

The dependence of forest fringe communities on the forests can be further assessed from state wise data on removals from forests by these communities.

Dependency on forests in Himachal Pradesh, Nagaland, Tripura and Uttarakhand on per capita basis is one of the highest.

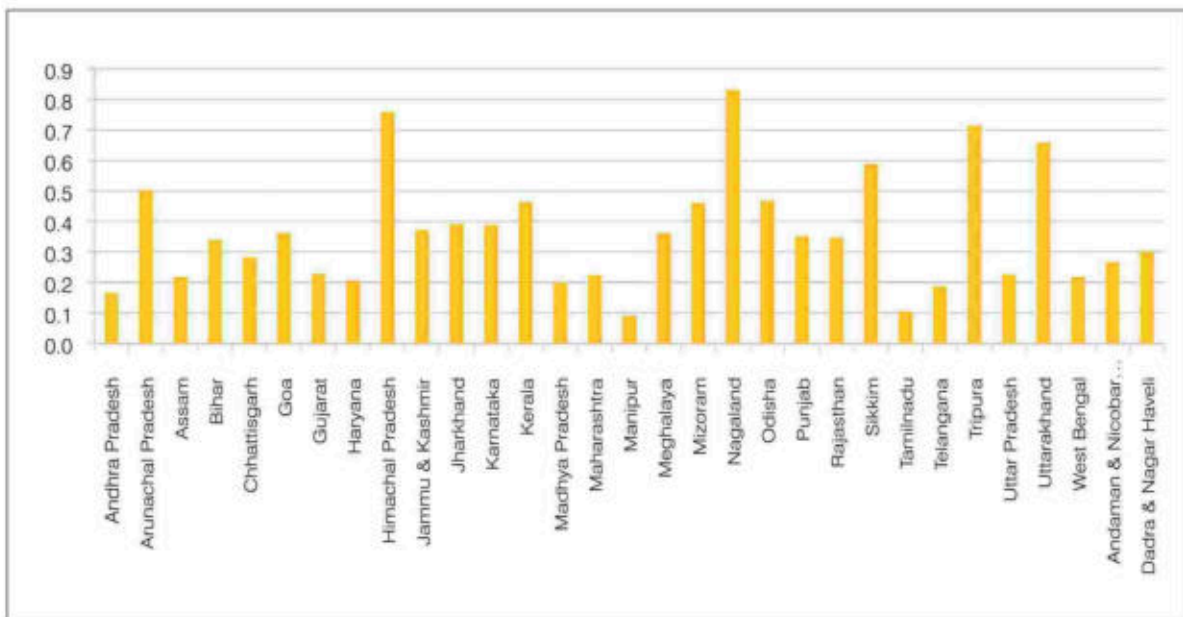


Figure 23. Average removal (Tonnes per capita/ annum) of fuelwood from forests



The National average per capita fuelwood extraction per annum in 2019 by people residing in FFV was 0.278 tonnes per person, the highest per capita extraction being in Nagaland (0.83 tonnes per person), Himachal (0.759

tonnes per person) and Tripura (0.714 tonnes per person) and the lowest being in Manipur (0.09 tonnes per person), Tamil Nadu (0.105 tonnes per person) and Andhra Pradesh (0.165 tonnes per person).

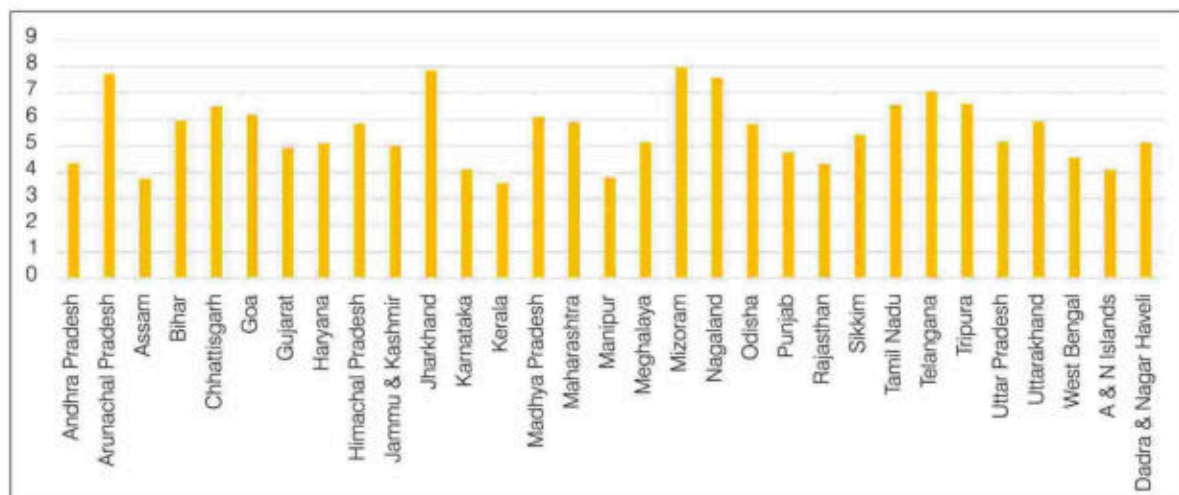


Figure 24. Average removal (Tonnes per capita/ annum) of fodder from forests

The fodder extraction per capita per annum (as of 2019) from forests by forest fringe villages is highest in Mizoram at 7.97 tonnes per capita per annum, followed by Jharkhand (7.866 tonnes per capita) and Arunachal

Pradesh (7.726 tonnes per capita). The lowest extraction is in Manipur (3.813 tonnes per capita), Assam (3.751 tonnes per capita) and Kerala (3.601 tonnes per capita).

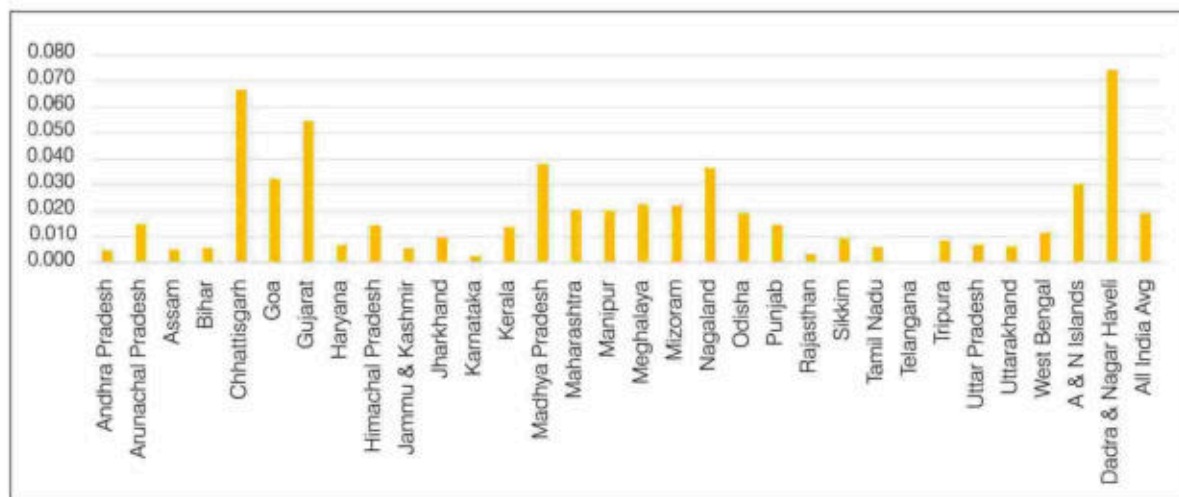


Figure 25. Average removal (Tonnes per capita/ annum) of small timber (cum) from forests

For small timber, the average per capita per annum extraction from forests by communities living in forest fringe villages in 2019 is 0.19 tonnes per capita. Dadra and Nagar Haveli (0.074 tonnes/capita), Chhattisgarh (0.067 tonnes/capita) and Gujarat (0.055 tonnes/capita)

are the top three States in per capita extraction of small timber while Telangana (0.0001 tonnes/capita), Rajasthan (0.003 tonnes/capita) and Karnataka (0.003 tonnes/capita) are the lowest.

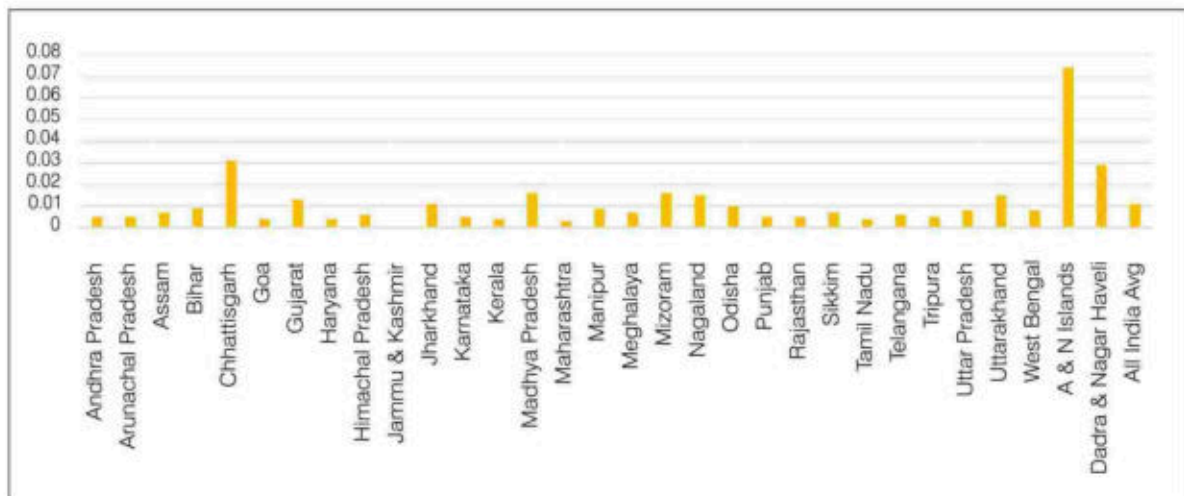


Figure 26. Average removed Tonnes (per capita/ annum) of bamboo from forests

For Bamboo, the average per capita extraction per annum in forest fringe village in India in the year 2019 was 0.011 tonnes. The highest per capita extraction took place in Andaman & Nicobar (0.074 tonnes/capita), followed by Chhattisgarh (0.031 tonnes/capita) and Dadra and Nagar Haveli (0.029 tonnes/capita). The lowest extraction took place in Jammu & Kashmir (0.0005 tonnes/capita), Tamil Nadu (0.004 tonnes/capita) and Maharashtra (0.003 tonnes/capita).

Forest fringe villages have a significant impact on sustainability of forest resources mainly by accelerating the drivers of degradation related to uncontrolled grazing and removal of firewood. Although about 300 million households have been provided LPG connections in the country, there is no data regarding the percentage of calorific value required for household purpose covered by LPG in the FFVs. The assessment done by FSI show that more than 60 percent of fuel requirement in the FFV are still being fulfilled by firewood collected from forest areas.

Similarly, exact data on cattle in the FFV is not available however these villages would be home to a significant population of the 536 million⁸¹ cattle in the country. The rural population and specially in the FFV are still not used to procuring / growing fodder for cattle or practicing scientific animal husbandry practices and follow traditional practices.

Shifting cultivation practised in some parts of the country, especially in the North East region with increased crop cycles and declining fallow period is creating significant impact in forest degradation. Different estimates for area under shifting cultivation ranges from 5 million ha to 11.6 million ha involving 3 to 26 million people in 16 different

States in the country (MoEF, 2006). This has led to degradation of traditional grazing land within villages as well as nearby forests, but the economic impact of such degradation has been accepted by the people because their animal husbandry traditional practices are based on use of free resources i.e. water and fodder.

Agricultural systems in the forested regions are inextricably linked to forest ecosystem. Usufructs sourced from forests in terms of small timber, poles, and other materials from forest for agricultural implements and fencing the agricultural fields, leaf litter for manure, herbs, and medicinal plants to deal with pests provide a safety net to people of FFV, especially in view of the predominantly subsistence agriculture being practiced.

The above data also suggests that dependence on forests for communities residing in FFVs is directly connected to their income and livelihood status. This highlights the fact that a closer attention to the development needs of people residing in these areas is a must if degradation on forest ecosystem is to be addressed.

Diversion of forest land for infrastructure and industrial development takes away land available for carbon sequestration, maintaining ecological balance and in most cases promotes land degradation by causing fragmentation of forest landscapes. Development of infrastructure within forest areas make forests vulnerable to increased human activities. In case of large projects like dams etc. where diversion of forest land has been done along with resettlement of communities, nearby forest land has been subjected to further pressures by re-settlers.

⁸¹ <https://pib.gov.in/PressReleasePage.aspx?PRID=1588304>



8.4.4 Forest Land Diversion

As per the data published by MoEFCC, about 1.5 Mha of forest land has been diverted since 1980 under the Forest Conservation Act, 1980 (FCA).

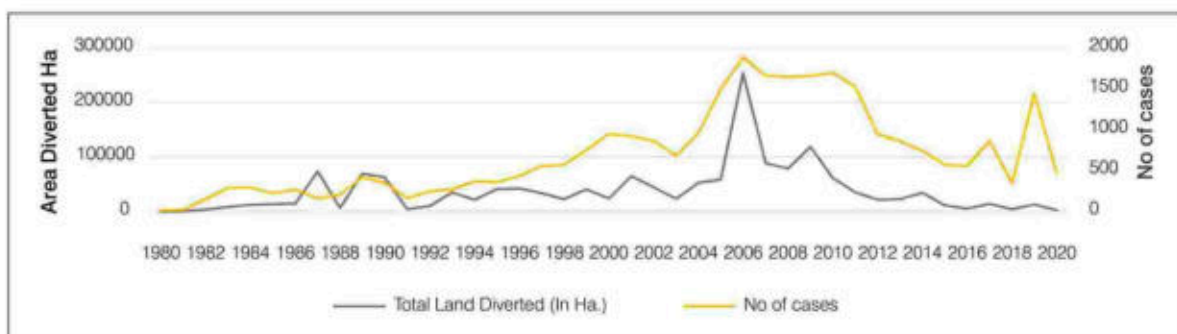


Figure 27. Forest are diverted under FCA since 1980

A general rising trend of diversion of forest land can be observed from 1980 onwards with the number of projects for diversion having increased sharply between 2003 and 2006. In recent decades, the area diverted has reduced from 65141 hectares in 2001 to 2689 in 2020. The highest

diversion was approved in 2005 at 2,54,054 hectares. Since 2005 the trend has reversed, except in 2017 and 2019, when the number of cases of land diversion have increased. However, in terms of area, there has been a downwards trend in forest area diverted.

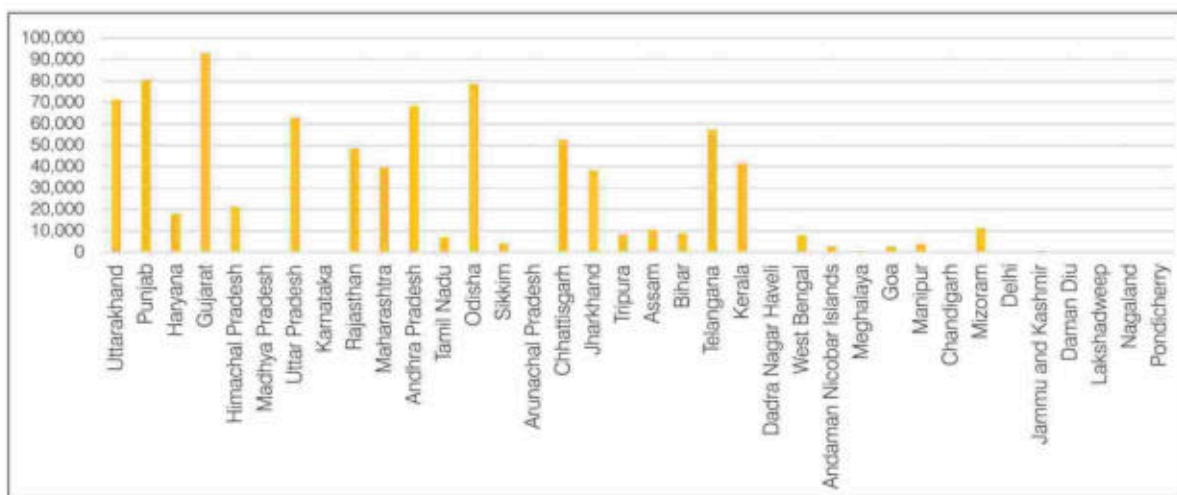


Figure 28. Forest land diversion (in Ha) in States under FCA

Details of forest land diverted can be referred in Annexure-11. In terms of area of forest diverted with respect to the recorded forest area in the state, Punjab and Haryana top the charts in spite of being states with low forest area, mostly because of diversion of roadside which are declared as forests land. A higher percentage of forest land

diversion has been observed in states, like Arunachal Pradesh, Gujarat, Uttar Pradesh, Kerala, Madhya Pradesh, Karnataka, Goa etc. In general, it can be implied that the pressure of forest land diversion is both a function of the level of economic development of the state as well the extent of geographical area recorded as forests.



The amount of money collected from user agencies for forest land diversion is also proportionate to the extent of forest land diverted. As on date, about Rs. 560 billion has been collected out of which about Rs. 475 billion was distributed to the states under The Compensatory Afforestation Fund Act, 2016 (CAMPA Act).

Overall, the forest land diverted has been on a decline trend.

Many studies on how to compensate States having a higher percentage of forest area which impact their economic development opportunities have been conducted. Forest was introduced as one of the criteria for devolution of taxes to states in the Fourteenth Financial Commission and a weight of 7.5% was given for calculation

of share of taxes. This formula has been continued in the Fifteenth Finance Commission Award also. However, more work is required for adequately capturing the environmental cost of development and compensation of the same in distribution of share of revenue to the states or compensation mechanism under the FCA. Also, to discourage indiscriminate diversion of forest land, especially in landscapes having cascading effect, adequate policy and administrative measures have to be put in place. Earlier a "go" and "no-go" concept was tried but was not persisted with. Development imperatives are understandable, however certain non-violate forest areas are required to be identified where there could be no bargain for forest land diversion.

8.4.5 Trees Outside Forests

The Tree Outside Forests (TOF) is 9.5 Mha and constitutes 2.91% of the area of the country as per the ISFR 2021 which was 8.14 Mha in 2001. Thus a 16.5% increase in TOF has been recorded in about two decades.

TOF has shown a 16.5% rise in the last two decades.

Wood from non-forest area supply about 90% of the timber and pulp requirement of the wood-based industry as they serve a vital requirement of the economy. TOF is expected to be the major contributor towards the effort to reach the goal of 33% forest and tree cover. TOF is also expected to be a major contributor towards increase in carbon pool as India moves on the path to achieving the target set under NDC to UNFCCC.

An Expert Committee was constituted by MoEFCC in 2018 (MoEFCC, 2018) to look into the strategy for increasing green cover outside recorded forest area. There were six working groups in the committee on (i) Classification of Agricultural Region into Silvi-climate Zones, (ii) Production of Certified Quality Planting Material (QPM), (iii) Suppling Government Finances, (iv) Rationalisation of Existing Regulatory Regime, (v) Monitoring and Evaluation of Progress of TOF, and (vi) Sustainable Management of TOF. The major recommendations of the committee inter alia included R&D to develop suitable combinations of agriculture crops and trees, agroforestry models, making available certified QPM, digital platform to share market

information on non-wood forest produce, evolving suitable business model for tree cultivation, developing carbon registry, certification of wood, rationalizing felling and transit prescriptions, developing centralized database for monitoring TOF outside forest areas, leveraging GEF and GCF funding, etc.

There is a huge market and unsatisfied demand of wood and wood products in the country which is borne by the fact that India imported Rs. 397 billion²⁰ worth of wood and wood product in FY 2020. A part of the demand can be fulfilled by wood from non-forest areas. In addition to reducing pressure on forests for wood, it would also provide additional green cover as well as save foreign exchange. To make this a reality, necessary policy and administrative actions would be required in the areas identified by the Committee as mentioned in the para above.



²⁰ <https://www.statista.com/statistics/625460/import-value-of-wood-india/>



8.4.6 Degradation of Wetlands and Waterbodies

Wetlands have been providing services like water for irrigation, fisheries and recreational uses, ground water recharge, flood control and silt capture, carbon sequestration in existing biomass (plants, animals, bacteria and fungi) etc. However, in certain circumstances, wetlands are also sources of Methane which is a Green House Gas.

Wetlands are also home to large number of diverse flora and fauna which are an integral part of such ecosystem and help maintain their integrity. For example, the total numbers of aquatic plant species exceed 1200 and they provide a valuable source of food, especially for waterfowl (Prasad *et al.*, 2002). The freshwater ecosystems of Western Ghats, running along the west coast covering a total area of 136,800 km², alone has about 290 species of fish; 77 species of Mollusc; 171 species of Odonates; 608 species of aquatic plants; and 137 species of amphibians. Out of these, almost 53% of freshwater fish, 36% of freshwater Mollusc, and 24% of aquatic plants species are endemic to this region (Molur *et al.*, 2011). Similarly, Loktak lake in Manipur also serve as sink for many contaminants in agricultural and urban landscape and play a crucial role in water quality improvement. Due to its unique ecosystem it is also the only refuge of the endangered Manipur Brow-Antlered Deer.

As per estimates, 10–15% of the nutrients added to the soils through fertilizers eventually find their way to the surface water system (IIT, 2011). High nutrient contents stimulate algal growth, leading to eutrophication of surface

Waterbodies are under extreme threat due to land use change, leaching of fertilizers and pesticides, dumping of effluents, and loss of aquatic biodiversity.

water bodies. Studies indicate that inorganic Nitrogen and organic Phosphorus in water usually stimulates undesirable algal growth in the surface water. Global climate change is expected to become an important driver of loss and change in wet-land ecosystem (WRI, 2005).

Thus, wetlands are facing typical challenges which are reflecting in their ability to continue serving the critical functions primarily because of:

- (i) Reduction of inflows and deteriorating quality of runoff and excessive nutrient loading
- (ii) Many have been converted to sinks of untreated effluents from urban and industrial centres
- (iii) Draining and encroachment

Criticality of conserving and protecting wetlands is well understood. However apart for the larger well know wetlands, waterbodies which are spread over the larger rural and urban landscape have been facing apathetic treatment leading to substantial threat to their sustainability. Threat to wetlands have also resulted in threat to many species of freshwater fishes.

The Wetland (Conservation and Management) Rules 2010 has been replaced by the Wetlands (Conservation and Management) Rules, 2017. The rules have enlarged the scope of wetland conservation through institutions like the State Wetland Authority and National Wetlands committee along with delegation of powers. The meaning of wetland and wetland complexes have enlarged the wetlands that are covered under the Rules.

It is important to bring attention to wetlands and waterbodies in the country as part of the LDN strategy which included proper inventorying, and multi-disciplinary and departmental intervention for their protection and conservation.

8.4.7 Pressure on Mangrove and Coastal Ecosystems in the Country

Ecological importance of mangroves and mudflats have been well researched and are widely documented. The total area under Mangroves in the country is 4,992 square kilometres. Of the ten States and 2 Union Territories having a

mangrove cover, the maximum cover is in the State of West Bengal (42%), followed by Gujarat (24%), and Andaman and Nicobar Islands (12%) as per ISFR 2021 is given below:

**Table 21. Extent of mangrove cover in India**

S. No.	States/UTs	Mangrove Cover as per ISFR 2021	Mangrove Cover as per ISFR 2019	Change in area in sq. kms between 2019 and 2021
1	Andhra Pradesh	405	404	+1
2	Goa	27	26	+1
3	Gujarat	1175	1,177	-2
4	Karnataka	13	10	+3
5	Kerala	9	9	-
6	Maharashtra	324	320	+4
7	Odisha	259	251	+8
8	Tamil Nadu	45	45	-
9	West Bengal	2114	2,112	+2
10	A&N Islands	616	616	-
11	Daman & Diu	3	3	-
12	Puducherry	2	2	-
	Total	4,992	4,975	17

In addition to mangroves, studies using satellite images, at a 1:50,000 scales reveal the occurrence of extensive mud/tidal flats, particularly along India's north western and eastern coasts which cover a total area of about 2.34 Mha and 90% of which are located in the State of Gujarat.

Mangroves and coastal mudflats are one of the most vulnerable ecosystems. With increasing demands for development led by focus on international trade, concentrated on creation of coastal infrastructure, prime mangrove areas and mudflats are highly threatened. In addition, urbanisation, industrialization and discharge of sewage are other causes of threat to mangroves. Aquaculture/ shrimp farming and salt panning works are other activities which impacts the coastal regions of the country. There are detailed guidelines on shrimp farming and aquaculture by Central Aquaculture Authority, however unscientific shrimp farming is one of the major causes of degradation of land.

Increasing salinity of water in estuaries and their impact on coastal land is another area of concern which requires further studies and data to pinpoint causative relationships. An example of such a change is the case of Narmada Estuary and villages along it which were once *Cheeku* (*Manilkara zapota*) and other fruit rich zones, but now orchards are destroyed as estuaries have become more saline due to no

e-flows. Such studies will also strengthen the scientific case for mandatory e-flow in large dams.

The Coastal Regulation Zone Notification 2019 (published on 18.1.2019) has categorized mangroves and biologically active mudflats in the environmentally most critical areas under CRZ-I A. Protection offered is stringent however creeping encroachment of such areas including blocking or diverting natural drainage channels are affecting the existing such ecosystems in some places.

Mangroves and mudflats are unique ecosystems and do not fall in the typical work subject being dealt with Forest Departments. The role of the department is also limited unless mangroves areas are also declared forests. An agency to whom dedicated responsibility of proactively managing/ protecting mangrove can be mandated appears to be a necessity.





8.5 Existing Strategy for Addressing Land Degradation

Apart from the policy framework already in place which has been discussed in Chapter 3, the challenge of land degradation has been addressed through key programmes implemented by Central and State Governments. These programmes range from sector specific interventions of forestry sector like afforestation and forest landscape development, forest protection, conservation of protected areas, conservation of aquatic ecosystems, interventions in agriculture sector like soil conservation, horticulture development, bamboo development, agroforestry, rainfed area development, soil health, organic farming, water sector interventions like conservation and development of surface and ground water sources, watershed development and interventions with cross sectoral linkages like MGNREGS, development of renewable energy and biofuels. Details of the programmes along with funding has been discussed in Chapter 6.

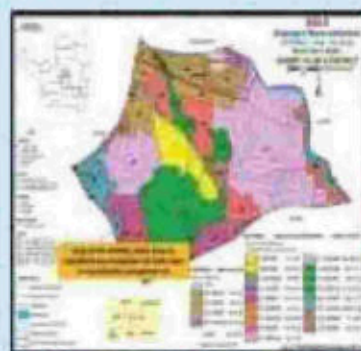
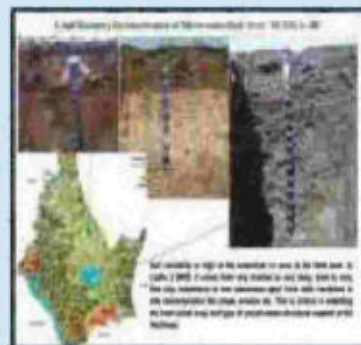
Apart from addressing climate change, two of the eight missions announced under National Action Plan for Climate Change (NAPCC, 2008) directly support the efforts to tackle land degradation. The National Mission for a Green India aims at increasing the tree cover to 33% of the geographical area by treatment of the degraded forest land through direct action by communities, organized under Joint Forest Management Committees and guided by the state forest departments. The National Mission for Sustaining the Himalayan Ecosystem sets a goal for conserving the eco-system and biodiversity at high altitude Himalayan region. In mountainous regions, the aim is to maintain two-thirds of the area under forest cover to prevent erosion and land degradation and ensure the stability of the fragile eco-system.

Best Practice: Land Resources Inventory (SUJALA III project in Karnataka)

- Land Resource Inventory (LRI) is an assessment of the status and changing condition of soil, water and related resources at the field level.
- The LRI database is generated on a geo-referenced cadastral map (1:7829 scale), superimposed on Cartosat/Quick Bird imagery.
- The land parcels are grouped into management units based on similarity in soil and site characteristics
- Runoff modelling is done for the land unit
- Included Decision Support System for soil nutrient management

Uses:

- Provides useful analytical outputs that can be used by different Government departments and other stakeholders in the planning and monitoring of rural development or agriculture related works.
- Farmers can use land suitability maps for crop selection and for targeted crop-specific nutrient management as soil health card generated from LRI shows the nutrient deficient areas of the farm
- Crop specific fertiliser needs of major crops can help the farmer to apply only the required quantity of fertilisers to the crop.
- LRI can provide farmers with advisories on crop selection, water and nutrient management, package of practices needed at different stages of the crop cycle.
- LRI outputs can also be used for identifying, prioritising and allocating works for soil and water conservation in watershed area, MGNREGS or any other such scheme.
- LRI can also be used for reclamation of degraded areas and wastelands as appropriate afforestation and interventions can be planned for specific sites.





Majority of the financial resources in this area has been provided from public funding including support by multilateral bodies like the World Bank, JICA, ADB and other such bodies. A very vibrant ecosystem of NGOs working at the local level with donor support is also present which are providing valuable contribution in water conservation, participatory water management, capacity development and training and institution development. However, the extent and reach of these non-government organisations has remained limited along with replication and upscaling of good practices achieved in select locations. Some of these issues have been discussed in various sections of this report.

As far as the strategy for addressing degradation in forests is concerned, the main approach has been afforestation and reforestation in degraded forests or forest land post harvesting under normal forestry schemes and compensatory afforestation, developing tree lots outside forest areas in panchayat or revenue land under social forestry programmes, and strengthening forests and plantation protection measures through tighter enforcement. In some places limited interventions on livelihood related activity is taken up through JFMCs or EDCs. In last few years there have been efforts to converge with other government schemes like MGNREGS, Rural Livelihood Mission, Skill Development, etc. It is mandatory to undertake forestry activities as per the prescriptions under the Working Plan, which are to be prepared as per the National Working Plan Code 2014.

As per the National Working Plan Code-2014 (MoEFCC, 2014), the objective of a working plan is sustainable management of forests. The code prescribes very robust and scientifically driven methodology for inventorization and estimation of quality, status and health of the forest resources. This also specifically mentions that the working plans should also cater to biodiversity conservation, JFM and community involvement, fringe forest management, water resources management, forest health, forest fire and forest protection, climate change and carbon sequestration. However, the code still has a very strong flavour of the legacy of the production forestry, an activity which does not have any place in most of the degraded forests areas of the country, where there is hardly any economic or silvicultural reason to carry out extractions from the forests due to little or no harvestable resource available.

While there is no accurate information on the extent of degraded forests in India, various estimates suggest it could be as high as around 40% of the recorded forest area. In view of the extent of the problem, the working plan could also focus on guidelines for restoration of such forests, more specifically on actions to reduce or stop stress factors which are causing degradation and recouping the vegetation and biodiversity of the area. This is an area and gap in the National Working Plan Code-2014.

In spite of continuous intervention over the last few decades, the problem of land degradation remains acute, mostly due to the high pressure of population and their development needs, but also due to limitations of funding, capacities and institutional weakness.

8.6

Future Strategy for Achieving LDN Target

Achieving LDN by 2030 has to be viewed from two dimensions, both of which are important.

- (a) Avoid, reduce and/or reverse land degradation in order to achieve a state of no net loss of healthy and productive land.
- (b) Restoration of 26 Mha of land as per the target set by the government.

Addressing land degradation would require counterbalancing within land use and to estimate in advance of any decision on land use, the potential change both positive and negative. Also care has to be taken to plan counterbalancing in "like for like" as gain in one land type cannot counterbalance the loss in another land type (Orr *et.al.* 2017). However, reversing land degradation is often a slow process therefore the best

approach is to avoid land degradation in the first place.

As per the Desertification and Land Degradation Atlas of India (SAC, 2016) there is a cumulative increase of 1.87 Mha area undergoing process of desertification/ land degradation in the country (constituting 0.57% of the TGA of the country) during the time frame 2003-05 and 2011-13. In the same period around 1.95 Mha land has been reclaimed and 0.44 Mha land has been converted from high severity to low severity degradation class, indicating improvement. On the other hand, around 3.63 Mha productive land has degraded and 0.74 Mha land has converted from low severity to high severity degradation class. Annualizing the degradation (although there may be some issues of inaccuracy involved in doing this), approximately 0.23 Mha is added to the land undergoing



the process of degradation every year. Achieving the first dimensions of LDN means reducing the rate of degradation as well as restoring equal extent of lands on the same time frame.

The country has restored 9.8 Mha of degraded land between 2011 and 2018 and another 15 to 16 Mha is expected to be covered up to 2030. This means that the target of achieving restoration of 26 Mha by 2030 is track. However, there could be many challenges in this journey, given that the unprecedented pressures on land

continues unabated and is expected to intensify in the coming years. The achievements in recent years are not reflected in the National level assessments conducted by various agencies on the extent of wastelands and areas under threat of desertification, probably due to lag in capturing data for the purpose. The business as usual approach therefore may not be the best approach to tackle LDN in the country. Accordingly, three main areas are identified which requires attention for achieving the LDN targets notified for 2030:

8.6.1 Gaps in Actionable Data and Technology

- India has done exemplary work in mapping land degradation over the last decade. However, there are various definitions being used for classification of such lands. Identification of degraded land at land parcel / forest compartment level has also been a challenge because this involves ground verification of a substantial amount of data points. Since the assessments so far have been conducted by National level agencies, they are constrained in reach due to the vast area of the country. A standard definition and methodology for identification of degraded land, along with dedicated institutions at the State level which can identify such land and prioritize these lands for restoration over the next 10 years is a clear gap. As mentioned earlier, several agencies and programmes are working in this area, therefore the next step after prioritization would be identification of agencies responsible for these areas. This process would increase accountability of agencies and produce improved outcomes.
- While the wasteland of the country has been mapped by NRSC, there is absence of data on degraded forest land. FSI only conducts mapping of forests and tree cover based on density class. There would be some data under vegetation degradation in the SAC report of 2016, however actionable details of such forest are not available. Forest land that have degraded over last 20 years (since the period from which high-quality satellite data is available) showing reduction of density by 0.2 or more should be mapped to target restoration. This could be a more scientific way of identifying target forest areas for restoration rather than to target low density forest land in general. Identification of area for taking up plantation is a part of the compartment mapping exercise undertaken during preparation of forest Working Plans, however data collection in this manner based on ocular estimate may not be that accurate for planning forest restoration activities. The true extent of degraded forest land could be estimated in a reasonable time only by using technology.
- Mapping of wasteland has been done using satellite data along with ground verification at selected points by NRSC, but it will be also useful to compile the extent of wasteland existing on revenue record and identify them on the digitized village maps which could be used for planning. This data along with the data in the Wasteland Map would be very helpful for planning restoration of wastelands by prioritizing culturable wastelands. Prioritization is done while preparation of watershed management plans, however the watershed DPRs do not give a National level perspective for planning.
- Mapping of wetlands in the country is another aspect which has been a gap. The last large-scale assessment was done in 2011. Such assessment of wetlands and waterbodies and survey of its health and conservation status is needed to be done regularly. Identification of agencies at the ground level who would be responsible for coordination the efforts of conservation of wetlands is also missing in the current institutional arrangement. Proper scientific studies on wetlands that are the beyond the list of popular ones should also be taken up for creation of an authentic baseline for future management purposes.
- In view of the challenges in committing financial resources for the purpose, it is important to develop alternate models of funding which may involves various levels of contribution by community and private sources. Since the productivity of degraded land varies across various classes and geographies, sub classification of degraded lands is important so as to deploy models where economic benefits could be returned after investment to make it more lucrative for private participation and for sustainability. Such sub classification would also enable pieces of land which could be developed with viability gap funding, thus optimizing the use of funds and covering more area with the same financial resources.
- As already discussed earlier, there is a great diversity in types of lands which are classified as degraded. Each



type would require a science-based approach and specific technology-based input for restoration. Deployment of appropriate technology is therefore key

for better success. Upscaling of successful models for land restoration is another gap that is evident within the current mechanisms and programmes being employed.

8.6.2 Institutional and Funding Gaps

- India has a strong framework to deal with sustainable land management through various sector policies such as the National Forest Policy, 1988; National Water Policy 2012; National Policy for Farmers 2007; National Livestock Policy 2013; National Environment Policy 2006; National Biodiversity Action Plan 2008 and the National Action Plan on Climate Change 2008, etc. This also brings in complexity with difference departments and institutions at Centre and State levels dealing with and implementing sector specific programmes. Often the programmes are implemented on the same landscape / piece of land by multiple agencies. There is, however, need to consider drivers of land-use change holistically and find a way to harmonise interventions both at State and Central levels by establishing institutional linkages.
- The Working Plan Code may be modified to give more focus on restoration of degraded forests. In the current form, the code still has a high inclination toward forest inventorization and sustainably managing harvests, be it wood, or NTFP. Whereas the large extent of degraded forest land requires a different two-fold approach for reducing stress while providing time for recouping their health, and at the same time managing the cost and benefits of such intervention in an equitable manner to sustain the efforts to restore the forest land.
- The three key departments which could be responsible for achieving majority of the LDN targets would be Forests, Agriculture and Rural Development and a closer coordination among these departments at the Centre and in the States would be a key enabler.
- Financing land degradation neutrality is a challenge for most developing countries, including India. It is important to identify how much funding is required for achieving the LDN targets and how has it to be utilized in a sustainable manner to achieve the desired results.
- Estimates of investment for restoring or reclaiming wasteland or degraded land vary widely which itself present a problem for planning and committing funds. The range of estimates is given in Table 20.
- Such varied cost structures complicate the estimation of investment required for restoration of degraded land and combating desertification, as well as seeking commitment of public funds in the face of competing requirements. To tide over this constraint, detailed planning of land to be targeted for restoration would be important.

Table 22. Representative costs for restoration of land

S. No.	Programme	Investment in Rs. per ha
1	Green India Mission	15,000 to 100,000 ^{aa}
2	Watershed Programmes	20,000 to 30,000 ^{aa}
3	ANR in degraded forest land	1,50,000 ^{ab}
4	CAMPA Plantation Models	1,39,000 to 5,38,000
5	NHAI plantations cost	2,80,000
6	Rehabilitation of Acidic / Sodic land	£56,000 ^{ac}
7	Rehabilitation of mine waste	Up to 9,50,000 ^{ad}
8	Rehabilitation of grasslands and rangelands	80,000 (non-irrigated model)
9	Bundelkhand Package	\$45,000 ^{ae}

£ value in 2011; \$ value in 2009 (sources mentioned for individual items in footnotes)

^{aa} Rates for 2015, Operational Guidelines for GIM

^{ab} Scheme rates under WDC-PMKSY (revised), watershed projects undertaken by ICRISAT

^{ac} Representative rates for approved schemes for Forest Department in the country

^{ad} Rates for 2015, Operational Guidelines for GIM

^{ae} https://coal.nic.in/sites/upload_files/coal/files/curentnotices/Guidelines-for-Mining-plan-Coal_16122019.pdf

^{af} Blended rate in 2009 for 1.1 million ha of watershed, 0.423 million ha of agriculture land, 10000 ha of horticulture and 60000 ha of forests development- equivalent to Rs 102,000/ha at 2020 value



8.6.3 Gaps in Enabling Environment

- Treating wastelands present an opportunity for India to achieve its LDN targets. However, treating wastelands, especially those located outside the forest areas present numerous challenges. For example, treating wastelands through agroforestry can be a motivation for farmers if they are able to realise a good return from the sale of harvest. However, in many States there still exist challenges for farmers to harvest trees and transport them to the nearby markets which acts as a disincentive. Tree crops still compete with agriculture produce and with the subsidy regime, they are often not the first choice of farmers even if they make better ecological and economic sense in the medium to long term. Changes in policies need to be made in States to make agroforestry more attractive to farmers.
- High intensity agriculture being practiced due to current regime of subsidies and incentives along with overuse of inputs is one of the main causes land degradation. While soil health is given adequate attention, addressing land degradation/ restoration on private lands is missing in programmes and policies of the agriculture sector. Most of the farmers in India are small and marginal farmers who do not have enough capital to invest in their own farms. Changes in policies and programmes need to be made so that adequate investments can be made in the marginal land owned by small and marginal farmers. Wider extension of techniques and tools are also missing which causes a hindrance in propagating sound agricultural practices to reduce or cease land degradation of agricultural lands.

8.6.4 Strategy for Target Setting

- The four-step target setting exercise as defined by UNCCD is required to be followed. Accordingly, coordinated effort for target setting to cover 26 Mha of degraded land by 2030 would be extremely necessary rather than a business as usual approach. Identifying targets under individual schemes would be a part of this exercise. Another dimension is identification of land parcel (if possible, in a reasonable timeframe) which could then be allocated under various scheme (or combination of schemes through convergence) of the departments identified. A beginning has already been made by MoEFCC by constituting a multi department committee. However adequate data needs to be provided to the committee for allocation of targets.
- The targets would also require to be broken down in the following land use classes:
 - ✓ Degraded forest land
 - ✓ Culturable wasteland
 - ✓ Agriculture land which are not current fallows/ degraded farmland
 - ✓ Closed mines/ areas under mine reclamation
 - ✓ Rejuvenation of water bodies
- ✓ Abandoned cultivation land
- ✓ Land under cultivation which can be taken under plantation/ horticulture as per land capability class or owner's agreement
- ✓ Grassland and common grazing lands
- ✓ Institution land/ vacant land in urban areas
- ✓ Along National and State Highways
- ✓ Vacant land under large industries
- Efforts in restoration of various categories of land mentioned above would also involve enabling guidelines and amendment of relevant rules to incentives the landowner and users to collaborate. For example, relevant provisions / clarifications would helpful for entities which have large tract of land to allay their apprehension that removal of green cover would not be allowed when they need the land for their business purposes. Similarly easing of restrictions of tree grown outside forests would be another area of reform. These have been covered in Chapter 12 of the report.
- Some examples of LDN strategies from developing countries is presented below:



China

Over 40% of the country is adversely affected with Challenges of land degradation. After more than 20 years of efforts in forest and land conservation, China has reversed desertification in 2004 and achieved LDN targets of UNCCD.

Achievements:

- Cultivated land areas: 124 mha in 2020 and 122 mha in 2030;
- Forest coverage: >23% in 2020 and >24% in 2030;
- Integrated vegetation coverage of grassland: 56% in 2020 and 60% in 2030;
- Newly controlled sandification land: 1,00 mha in 2020;
- Newly treated soil erosion areas: 32 mha in 2020 and 94 mha in 2030;
- Safe use of polluted arable land: 90% in 2020 and 95% in 2030;
- Natural wetland protection rate: >50% in 2020 and >90% in 2030.

Best Practices (Source WOCAT)

Apocynum planting to protect and profit from saline soils in the Tarim River Basin, north-west China – Plantation of *Apocynum pictum* and *Apocynum venetum* a protective and profitable indigenous plants – done on soils made saline through irrigation during cotton cultivation without adequate drainage.

Riparian forests along the Tarim River Basin have been reduced and degraded by the expansion of irrigated agriculture since the 1950s. With high evaporation rates and capillary rise of shallow groundwater, salts dissolved in the water accumulated on the soil surface and in the soil. This has caused salinization, which makes the fields unusable for cotton farming and the farmers abandon such fields. These barren saline soils are prone to wind erosion, as almost no

plants can grow on them. This causes large-scale desertification. *A. venetum* and *A. pictum* are both are drought and salt tolerant. They are *Rhizomatous perennials* – and importantly they are also cash crops. Fibre from the stems are used to produce textiles, through the extraction process is time and labor intensive. The leaves and flowers are also sold and used to produce tea which is a Traditional Chinese Medicine that reduces blood pressure. On a per hectare basis, the stem generates a potential income of US\$ 3,650, the leaves US\$ 1,995, and the flowers US\$ 1,815.

The crop is used to reduce, prevent, restore land degradation and to create beneficial economic impact.

Rotational Grazing (Inner Mongolia)

The pasture land is divided into several plots based on its productivity, and grazing period and grazing systems are fixed according to the carrying capacity of each plot. The demonstration plots were identified at spring and autumn ranges in Hexigten Banner of Inner Mongolia Autonomous Region.

Hexigten Banner initiated the project of rotational grazing in order to improve the living and production conditions of herdsmen, prompt reforms of local production systems and to preserve the ecological environment of grasslands. The main target of the project was to achieve the balance of pasture utilization, rational development of water resources, and eventually realize the balance between grass and livestock all the year through rotational grazing in summer and autumn and crops grown for silage, etc.

Over grazing is controlled and is in favour of pasture recovery, decrease desertification, solve the challenges between limited rangeland and growing demand of animal husbandry and improve awareness of ecological protection in communities.

Democratic Republic of Congo

Under the Bonn Challenge, the DRC has committed to restore 8 million ha of degraded and deforested lands by 2030 through afforestation, reforestation and the establishment of new plantations; Improve productivity of shrub lands, grasslands, and croplands in decline (5.4 mha); Increase by 17% SOC stock on all "forests and grasslands" with declining initial SOC stocks (2.1 million hectares) and those on which the initial SOC stock remained stable but weak (369,200 ha) during the period 2000-2015; End the conversion of forests and wetlands to other land use classes.

Best Practice (source WOCAT)

Use of the *Mucuna* plant for fertilization, stabilization and rehabilitation of unproductive land in Kenge in Kwango District, Bandundu Province – The plant has a large number of nodules that are rich in nitrogen and that are likely to fertilize the soil quickly. *Mucuna utilis*'s rapid growth is useful to cover degraded and unproductive lands and enrich them by supplying nitrogen contained in its nodules.



Bolivia

The area affected by degradation covers 41 percent of the national territory. Land degradation, threatens the loss of capability in agricultural and forest soils and aggravates poverty.

The LDN targets are quite prescriptive:

By 2028, strengthen sustainable management in at least 400,000 ha of flat arid or reduced slope areas; By 2028, reduce laminar erosion in slope areas. This includes the management of 200,000 ha of slope land; By 2028, achieve adequate soil management in at least 100,000 ha or large lowland savannas; By 2028, conserve and regain the capacity and area of 60,000 ha of highland wetlands through agropastoral management projects, tourism projects, etc.; By 2025, establish a clear understanding of Carbon dynamics in wetlands and Carbon retention potential; By 2018, adequately regulate forest land management, which could prevent degradation in more than 800,000 ha of forest lands by 2028; By 2030, aim to recover up to 30% of areas affected by salinization and aridity (60,000 ha); By 2028, ensure that prioritized and strategic

watersheds in Bolivia include restoration and slope cover concepts within their management strategy, as well as afforestation in areas without prior forest cover of agrological class VII, covering at least 100,000 ha (1,000 km²); By 2025, establish a regulatory framework that will guide actions on land management towards Land Degradation Neutrality status.

Best Practices (source WOCAT)

Gully control and catchment protection – integrated gully treatment consisting of several simple practices including stone and wooden check dams, cut-off drains and reforestation in sediment traps.

Dynamic agroforestry systems – Dynamic agroforestry systems are highly diversified farming systems which go through the different phases of the natural succession, from pioneer plant dominated stages up to primary trees dominated stages, where the different strata are used for different crops, and where pruning and selective weeding enhances the dynamic development of plant synergies.

Venezuela

Venezuela has been a member of the UNCCD since 1998. By 2018 it began the process to establish the goals for LDN. Venezuela has 14.41% of the area as degraded land.

The Country has set the following targets for LDN:

By 2030, increase forest cover by 262,361 hectares (0.53 per cent); By 2030, reduce by 50% the incidence of forest fires throughout the country; By 2030, 100,000 hectares of cultivated agricultural per year are recovered and maintained; By 2030, sustainable land management has been implemented in 50% of shrub and pasture cover as forests; By 2030, the integration of LDN into land use planning has been promoted and supported, particularly in areas with high critical levels of the land degradation process; By 2020, improve coordination between different institutions, civil society, trade unions and encourage participatory mechanisms; By 2020, improve the existing legal framework that helps to strengthen the LDN programme.

Best Practice (source WOCAT)

Biodiversity Conservation in the Productive Landscape of the Venezuelan Andes – The project will conserve the montane forest biodiversity and related ecological services of the Venezuelan Tropical Andes. The objective is achieved through the demonstration of sustainable agricultural practices and alternative livelihoods; adaptive management tools to facilitate the implementation of conservation measures from a bioregional viewpoint; capacity building of stakeholders; establishment of biological corridors through.

Protection and sustainable use of the Andean Paramo

A critical regulator of watershed hydrology, the Andean Paramo is an important source of biodiversity. Nearly 5,000 plant species, half of them endemic to this environment, live here alongside large mammals such as the Andean spectacled bear, the mountain tapir, and the emblematic Andean condor. The Paramo, however, is threatened by a variety of factors, including livestock farming and global warming. Conservation of the Biodiversity of the Paramo in the Northern and Central Andes, is being attempted by the UNEP/GEF project. Andean Paramo countries and a range of partners, including advanced research institutions, and non-governmental and community based organizations, are developing policies and incentives to support conservation and sustainable use in 14 different sites.

Brazil

Brazil and especially the Brazilian Amazon is vulnerable to climate change due to its complex, biologically diverse ecosystems. The Department of Forestry of the Ministry of the Environment suggests that there are 140 million hectares of degraded land in Brazil. Of these lands, about 30 million hectares are pasture areas under some stage of degradation, with very low productivity for animal feed.

The Bonn Challenge commitment for the Brazil is to restore 12 mha of land by 2030. This will provide a potential benefit of 3,768 million USD and potential climate benefit of sequestration of 1.14 Gt of CO₂.

Best Practice (source WOCAT)

The "Green Liver System": Eco-friendly water purification – Water purification using macrophytes to treat effluent from fish farming. The "Green Liver System" uses aquatic plants, established in artificial wetlands, to remove, transfer, stabilize or eliminate pollutants in wastewater from fish farms. The use of large quantities of feed in aquaculture, along with the application of antibiotics, hormones and probiotics, has negative impacts on aquatic ecosystems due to the introduction of nitrogen, phosphorous and drug residues into the system. The Green Liver System is a form of phytoremediation that uses a range of plants to decompose, extract, or hold contaminants present in soils and waters. The plants selected for use in Green Liver System artificial wetlands depend on the pollutant to be removed.

Biological pest control through promoting habitats for native fauna – Reducing the use of common agrochemicals by supporting preferred habitats of biological pest control agents like amphibians and by using alternative self-made organic pesticides.

Minimum tillage – Seed of maize and soy are planted directly into the soil with a minimum previous tillage impact after harvesting stubbles of maize or soy remain on site. When the planting season started the soil is opened by rolling discs pulled by a tractor. The seeds are directly put into the open soil which is compacted afterwards with rolling wheels of the same machine. With minimum tillage practices tilling and seeding operations could be implemented fast and very efficiently. The purpose is to avoid deep ploughing of the soils that would need much higher energy and costs and would lead to typical serious erosion problems in the tropics.

CHAPTER 9



SLEM in the Context of Sustainable Development Goals



"Sustainable Development" was adopted and popularized in 1987 in one of the reports by the United Nations Commission on Environment and Development. The definition used then was *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* and was used for the next 25 years. The UN Conference of 2012 emphasized the three dimensions of sustainable development: economic development, social inclusion and environmental sustainability. The inception of Sustainable Development Goals (SDGs) took place at the United Nations Conference on Sustainable Development in Rio de Janeiro, 2012. The conference helped all nations to address a common objective being faced by the world by producing a set of universal goals to meet

environmental, political and economic challenges. The SDGs are an extension to the Millennium Development Goals that had started in 2000 and carried the progress for 15 years in important areas of extreme poverty and hunger, preventing deadly diseases and expanding primary education to all children. All United Nations Member States adopted the 2030 Agenda for Sustainable Development in 2015 through 17 Sustainable Development Goals (SDGs), 169 Global Indicators and their targets for 2030.

The SDGs are important to every nation as they emphasize a holistic approach to develop a nation, bring in the factor of measurable changes in the well-being of people and enable an environment of peace and security and foster inclusion and participation to ensure informed decision making in addressing the root cause of poverty and equality.

9.1

Sustainable Development Goals in the Context of Land Degradation in India

India has played an important role in framing the Sustainable Development Goals (SDGs) since its inception. The country became the first nation to publish a government-led, sub-national measure of progress on SDGs under a voluntary national review submitted to the High-Level Political Forum on SDGs in 2017. Women's role in the adoption of the SDGs was also brought forth by India among the United Nations Member States. India's role is central to achieving the SDGs.

The Ministry of Statistics and Programme Implementation (MoSPI) has been entrusted with identifying the nationally available datasets that align with the 17 SDGs and their 169 targets. The MoSPI thus developed the National Indicator Framework (NIF) comprising 306 indicators for measuring India's progress against the SDGs and associated targets. It consists of nationally defined indicators corresponding to national priorities and needs. Of these, NITI Aayog has selected 62 Priority Indicators, guided by the NIF, to create an index to track the performance of states. NITI Aayog has

also done Scheme-wise and ministry/department-wise mapping of the SDGs.

Land can play an important part in accelerating the achievement of many SDGs. Maintaining and restoring land resources can play a vital role in tackling climate change, securing biodiversity and maintaining crucial ecosystem services while also ensuring shared prosperity and well-being. Healthy and productive land can play an unparalleled role as an engine of economic growth and a source of livelihood for billions worldwide, including the most vulnerable population. Achieving land degradation neutrality can become an accelerator of achieving the SDGs across the board. SLEM contributes to strengthening sustainable livelihoods, resilience to disaster and climatic variations, and access to natural resources resulting in increasing incomes and reducing uncertainties and the capacity of individuals and communities to bear temporary shocks.

9.1.1 SDGs in the Context of SLEM

Many of the actions under SLEM contribute directly to achieving the SDGs. More specifically, the contribution of SLEM towards SDG 15: Life on Land is direct and forms the core of the efforts in achieving this goal.

As land and biodiversity are key resources to secure life and livelihoods, SLEM contributes in a supportive way to the other SDG targets as well.

**Table 23. SDGs and their relationship with SLEM**

SDG	Relationship with SLEM
SDG-1: No Poverty	Securing right and equitable access to natural resources, land water and biodiversity, protection of tenure of land; covers ownerships and management of common property resources, including common forest resources, FRA implementation
SDG-2: Zero Hunger	Protection and improvement of ecosystem services from land, biodiversity including indigenous species of flora and fauna
SDG-3: Health and Well Being	Maintain forest cover, conserve biodiversity
SDG-4: Quality Education	Improve education on the relationship of humans with natural resources, nature education camps for practical exposure to students
SDG-5: Gender Equality	Understand gender impacts on land and forest degradation, Revision of existing gender neutral laws on the regulation of natural resources
SDG-6: Clean Water and Sanitation	Secure watersheds for long term provision of water, both in quantity and quality
SDG-7: Affordable Clean Energy	Recognition that biomass from agriculture and forests constitute a major part of fuel supply to people, address through policy measures
SDG-8: Decent Work and Economic Growth	The significant role of forests in providing livelihoods and wage employment to people in the forest fringe villages
SDG-9: Industry, Innovation and Infrastructure	Innovation in the use of wood and wood products, expanding forest-based industry by leveraging wood production from agroforestry
SDG-10: Reduced Inequalities	Inequalities in access to basic services and vulnerable livelihoods generate pressure on common land and forests, encourage unsustainable land-use practices
SDG-11: Sustainable Cities and Communities	Protection of green areas and water bodies as cities expand, land use policies in urban areas, especially in Municipal Councils and Nagar Panchayats
SDG-12: Responsible Consumption and Production	Sustainable harvest of forests and other biodiversity resources, checking illegal timber extraction and encroachment of public land
SDG-13: Climate Action	Agriculture, Forestry and Other Land Uses (AFOLU) responsible for 7% of the carbon emissions in India in 2013; Forestry and other land uses an important sink
SDG-14: Life Below Water	Impact on marine biodiversity
SDG-16: Peace, Justice and Strong Institutions	Institution building and capacity strengthening for community organization managing forests, biodiversity and water resources
SDG-17: Partnerships for Goals	Multi-disciplinary and multi-sectoral approach in implementing SLEM

Thus, SLEM also indirectly supports the achievement of other SDGs, namely SDG 1 - No Poverty SDG, SDG 2 - Zero Hunger, SDG 5 - Gender Equality, SDG 10 - Reduced Inequality, SDG 12 - Responsible Production and Consumption and SDG 13 - Climate Action.

In the context of SLEM, it is important to understand the key indicators and data availability to track incremental progress both at the national and sub-national levels. It will also be important to understand the key institutions and

agencies entrusted with collecting and monitoring relevant data. SLEM's contribution to achieving the identified goals also needs to be disseminated among the planners to secure resources and other support in terms of appropriate policy measures.

The SDGs can become an important enabling framework for concerted action as the Target Setting and monitoring mechanism can enable more holistic action on the multi-disciplinary and multi-sectoral dimensions of SLEM.



As identified by NITI Aayog, it is important to assess the starting point by various states in the context of SLEM in terms of:

- **Benchmark progress:** Use the India Index to benchmark their progress against the national targets and performance of their peers to understand reasons for differential performance and devise better strategies to achieve the SDGs by 2030.
- **Identify priority areas:** Use the SDG India Index as a tool to highlight the key areas on which the respective states/UTs need to invest and improve by enabling them to measure incremental progress.
- **Highlight data gaps related across SDGs:** The breakdown of the indicators at the sub-national level (up to district level), along with the availability of data, will bring out the need to increase the capacity and capability of data collection.

The sub-goals and indicators identified under the NIF and relevant to SLEM is given in Annexure 12.

NITI Aayog has done the higher-level work as far as institutionalizing SDGs is concerned, which consists of:

- (i) Creating shared understanding among the government
- (ii) Assigning goals and targets to the ministries to follow the “whole of government approach”
- (iii) Creating composite measures to advocate about the SDGs, including preparation of the India Index Baseline Report and Dashboard
- (iv) Developing the National Indicator Framework to monitor SDGs

Some of the actions identified that are further required are as follows:

- (i) Understanding the SDGs in Local Contexts: in course of the national consultations
- (ii) Adapting indicators and metrics
- (iii) Implementing the Policy Framework in states and UTs by encouraging states to undertake their visioning exercise to achieve the SDGs
- (iv) Organizing the implementation system

9.2 Targets and Indicators under SDG Relevant to SLEM

The SDGs are envisaged to become the de facto planning framework of the states wherein the processes of planning, budgeting, implementation and progress tracking are aligned to respond to the gaps in the SDGs. However, in the

context of SLEM, more progress is required, especially concerning the allocation of budget commensurate to the targets to be achieved.

9.2.1 Targets Directly Related to SLEM under SDG 15

As mentioned earlier, SLEM contributes directly to achieving targets under SDG 15, but there are other SDG targets, achieving which will positively impact SLEM.

For the SDG India Index, under SDG 15, the following indicators are being tracked:



**Table 24. Parameters for SDG 15 India index**

SDG Global Target	Indicators selected for SGD India Index	National Target Value
15.1 - By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements	Percentage of total land area covered under forest	33
15.2 - By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	Tree cover as a proportion of geographical area	33
15.1 - By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements	Decadal change in the extent of water bodies within forests from 2005 to 2015	--
15.3 - By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world	Percentage increase in the area of desertification	--
15.7 - Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products	Number of wildlife crime cases detected and reported annually	--

9.2.1 Targets Other Than SDG 15 Impacting SLEM

Targets under other SDGs, which impact SLEM positively are as follows.

Table 25. SDG targets other than SDG 15 impacting SLEM

SDG Global Target	Indicator	National Target value/ Change	Aspects that can impact SLEM
6.3 - By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	Percentage of industries (17 categories of highly polluting industries/grossly polluting industry/red category of industries) complying with wastewater treatment as per CPCB norms	100%	Treating wastewater will improve the quality of surface water and reduce groundwater deterioration, impact aquatic flora and fauna, conserve water sources
7.1 - By 2030, ensure universal access to affordable, reliable and modern energy services	Percentage of households using clean cooking fuel (LPG)	100%	Directly impact unsustainable removal of firewood from forests and wasteland
10.4 - Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality	Percentage of Tribal Sub Plan fund utilized	100%	Critical for development of forest fringe villages
11.6 - By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management	Percentage of waste processed	100%	Reduce pollution on land, degradation due to expansion of urban waste dump sites, green waste can be used to produce power, biochar, or organic manure
	Installed sewage treatment capacity as a proportion of sewage generated in urban areas	1%	



12.2 - By 2030, achieve the sustainable management and efficient use of natural resources	Percentage groundwater withdrawal against availability	70%	Reduce depletion of groundwater, improve the water use efficiency
12.4 - By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment	Percentage use of nitrogen fertilizer out of total N, P, K, (Nitrogen, Phosphorous Potassium)	57%	Impact reduction of soil fertility, degradation of water quality, which has a direct impact on health, multiplication of water bodies, reduce GHG emission
12.5 - By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	Municipal Solid Waste (MSW) treated against MSW generated	100%	Reduce pollution on land, degradation due to expansion of urban waste dump sites, health issues
13.2 - Integrate climate change measures into national policies, strategies and planning	Installed capacity of solar power as a proportion of installed grid -interactive renewable power	57%	Reduce pressure on the expansion of mines for fossit fuels, reduce emissions
14.1 - By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution	Percentage increase in the use of nitrogen fertilizers in the coastal states		Reduce land pollution due to overuse of fertilizer, impact coastal and marine ecosystems
	Coastal Water Quality Index	81-100	
14.2 - By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans	Percentage increase in area under mangroves	No decrease	Protection of creeks and channels, erosion, encroachment and diversion of coastal mudflats, protection of fragile ecosystems, fish spewing sites

SDG targets having potential for SLEM to contribute are given in the Table 26.

Table 26. SDG targets having potential to contribute to SLEM

SDG Global Target	Indicator	National Target value/ Change	Aspects that can be contributed by SLEM
Goal 2.3 - By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment	Rice, wheat and coarse cereals produced annually per unit area (Kg/Ha)	5033.34 kg /ha doubling the current national productivity	Sustainable agriculture practices, reducing loss of soil fertility, improving organic matter in the soil, including SOC, improving the biome, which are helpful to agriculture



SDG Global Target	Indicator	National Target value/ Change	Aspects that can be contributed by SLEM
6.1 - By 2030, achieve universal and equitable access to safe and affordable drinking water for all	Percentage of households having improved source of drinking water	100%	Conservation of surface water, recharge of aquifers, water budgeting, crop diversification, use of precision irrigation
6.6 - By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes	Percentage of blocks overexploited	0	

9.3 Future Strategy for Enhancing the Contribution of SLEM Towards Achieving SDGs

While the identification of key indicators and targets vis-a-vis benchmark levels has already been accomplished, the focus now requires to be shifted to the implementation of

the various strategies to achieve SLEM and thus tracking the progress towards the targets.

9.3.1 Action Required for Enabling SDGs

Three critical sets of actions are required to move towards the next stage of implementation of SDGs.

Identify resource gaps	Cascade state level targets to implementation level targets	Develop systems to capture performance data and for monitoring
Assess the resource gaps and devise strategy to bridge the gaps by expenditure prioritization, revenue augmentation and efficiency improvement to ensure sufficient financing	Need to cascade state level targets to the implementation agencies for tracking performance. This will also require localization of some of the SDG targets	Gaps in data required for performance evaluation to be identified, establish systems for data capture and reporting based on state level or local indicators

The efforts towards achieving the SDGs are expected to be only incremental to the efforts envisaged to be taken to implement and monitor programs for SLEM in the normal course. For example, in the case of the forest department, there is expected to be substantial convergence of purpose and effort for the strategies that will be required for achieving the SDGs as well as LDN & NDC, restoring degraded land, including degraded forests and reducing the pace of degradation of other lands, protecting wildlife and other biodiversity and involving people in the management of natural resources.

The approach will change somewhat for other implementation agencies, for example, the activities of the

agriculture department for achieving the SDGs in the context of SLEM wherein an exercise will be required to identify the key departmental indicators following the same three action points mentioned above for identifying those connected (in a major way) for delivering SLEM. It may be noted that other departments will have other indicators (beyond SLEM) for measuring their own SDG targets. This would require the owner department of SLEM to work closely with the other line departments to complete this process, prioritize activities, and collaborate on sharing resources, convergence and tracking performance.



9.3.2 Cascading SDG 15 Targets to States

To make the states more responsive and a partner to achieving the national targets, it is crucial to maintain transparency through a clear division of responsibility. In

this context, cascading of national targets to sub-national units will be important, as the subjects primarily fall in the domain of the states.

Table 27. SDG 15 targets to be cascaded to states

Indicator Selected for SGD India Index	National Target Value	Action points for cascading target to States and below
Percentage of total land area covered under forest	33	District-wise allocation of target, mapping and measurement infrastructures in place, activity monitoring
Tree cover as a proportion of geographical area	33	
Decadal change in the extent of water bodies within forests from 2005 to 2015	-	Mapping of water bodies, restoration and rejuvenation of water bodies, implementation of actions as per the Wetland Management Rules, involvement of people for sustainable management of water bodies
Percentage increase in the area of desertification	-	Mapping of water bodies, restoration and rejuvenation of water bodies, implementation of actions as per the Wetland Management Rules, involvement of people for sustainable management of water bodies
Number of wildlife crime cases detected and reported annually	-	Establishing a wildlife crime tracking system, developing tools to test and identify wildlife products, taking active measures to manage man-wild animal conflicts, tracking and neutralizing organized illegal trade in wildlife

A similar distribution of the state-level targets to sub-state level management units will be the next step in

operationalizing SLEM's contributions towards meeting the SDG targets.



CHAPTER 10



SLEM in the Context of Nationally Determined Contributions



In 2015, 196 Parties came together under the Paris Agreement to transform their development trajectories so that they could set the world on a course towards sustainable development, aiming to limit warming to 1.5°C to 2°C above pre-industrial levels. Through the Paris Agreement, Parties also agreed to a long-term goal to increase the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production. Additionally, they agreed to make finance flows consistent with the pathway towards low greenhouse gas emissions and climate-resilient development.

Paris Agreement and NDC

The Paris Agreement requests each country to outline and communicate their post-2020 climate actions, known as their Nationally Determined Contributions (NDCs). NDCs are at the heart of the Paris Agreement and the achievement of these long-term goals. They embody efforts by each country to reduce national emissions and adapt to the impacts of climate change. As per the agreement, Parties shall pursue domestic mitigation measures to achieve the objectives of such contributions. NDCs are to be updated every five years.

NDCs are important as together, these climate actions determine whether the world achieves the long-term goals of the Paris Agreement and to reach global peaking of greenhouse gas (GHG) emissions as soon as possible and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance

between anthropogenic emissions by sources and removals by sinks of GHGs in the second half of this century. It is understood that the peaking of emissions will take longer for developing country Parties, and that emission reductions are undertaken on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty, which are critical development priorities for many developing countries.

In 2014, the majority (60%) of GHG emissions came from just 10 countries. In contrast, only 3% of GHG emissions were attributed to the 100 least emitting countries⁴⁹. The revised NDC sets a new target to reduce emissions to 58% below the levels recorded in 2010 by 2035.

IPCC Sixth Assessment Report

The report of the Working Group I - Climate Change 2021: The Physical Science Basis was released on 9 August 2021 (IPCC, 2021). The report notes that the link between human-caused warming and increasingly severe extreme weather is now an established fact. The report also presents along with scientific data that without a sharp reduction in emissions a temperature rises of 1.5°C in the next 20 years and 2°C by the middle of the century is extremely likely.

At the global level, an estimated 23% of total anthropogenic emissions derive from Agriculture, Forestry and Other Land Use (AFOLU). The report brings in urgency in action on tackling global warming, and the contributions of the AFOLU becomes even more critical. The report also notes that urgent actions to stop and reverse the over-exploitation of land resources will buffer the negative impacts of climate change on ecosystems and societies (IPCC, 2021a).

The sixth Assessment Report of IPCC notes that without "net zero" carbon emissions by 2050, the earth's system would continue to warm.

Since the signing of the Paris Agreement in 2015, economic opportunities for climate action have changed significantly. New technologies for climate solutions are cheaper and more accessible than ever before, with pledges for more funds being made available under the global funding mechanism. The Sixth Assessment Report

will be the backdrop in which the COP26 will be held in Glasgow in November 2021. In all probability, the NDCs volunteered by the respective countries will come for review much before the target date, given the "net zero" commitment emerging out of the latest IPCC report.

⁴⁹ For example, Norway is one of the more recent countries to announce new National climate plans. In February, they announced a top-line target to reduce emissions by at least 50%, with the ambition of reducing emissions 55% below 1990 levels by 2030. Previously, Norway had pledged a targeted 40% reduction in emissions by 2030.



10.1 Nationally Determined Contribution and India

India's NDC, submitted to UNFCCC on 2 October 2016, underlines that it is not impossible to reconcile economic development and environment and for people to live in harmony with nature without undue exploitation leading to irretrievable damage and consequences.

Important Features of India's NDCs are:

- Put forward and further propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation.
- Adopt a climate-friendly and cleaner path than the one followed hitherto by others at a corresponding level of economic development.
- Reduce the emissions intensity of its GDP by 33 to 35 per cent by 2030 from the 2005 level.
- Achieve about 40 per cent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030, with the help of the transfer of technology and low-cost international finance, including from Green Climate Fund.
- Create an additional carbon sink of 2.5 to 3 billion tonnes of CO₂ equivalent through additional forest and tree cover by 2030.
- Better adapt to climate change by enhancing investments in development programmes in sectors vulnerable to climate change, particularly agriculture, water resources, Himalayan region, coastal regions, health and disaster management.
- Mobilize domestic and new and additional funds from developed countries to implement the above mitigation and adaptation actions in view of the resource required and the resource gap.
- Build capacities and create a domestic framework and international architecture for quick diffusion of cutting-edge climate technology in India and joint collaborative R&D for such future technologies.

About 12% of the country's emissions was offset by carbon sink action of forests, cropland and settlements.

As per third Biennial Updates Report (BUR), India's GHG emission is 2.838 GT CO₂e without LULUCF and 2.531 GT CO₂e with LULUCF (MoFCC, 2021). The sector-wise GHG emission in India is as follow: Energy 84 %, Agriculture 16%, Industries 9%, land use change and forestry -12 %

and Waste 3%.

Between 2010 and 2014, India's emissions increased at a CAGR of 5% compared to a 7% CAGR of National GDP (at constant 2011-12 prices), which indicated a reduction in emission intensity.

10.1.1 Discussion on India's NDC Target and Strategy to Achieve the Targets

Forests in India are treated as a social and environmental resource as against only a commercial resource having a significant role in the natural removal of carbon emissions from the atmosphere. The National Forest Policy, 1988, embodied all elements of sustainable forest management four years before the Earth Summit, where the global community agreed to the principles of sustainable forest management in 1992. Sustainable forest management

strengthens forests to perform the role of carbon sequestration more effectively. Improvement of quality of forests and addition of tree cover will be important elements in the roadmap for achieving the target of creating an additional carbon sink of 2.5 to 3 billion tonnes of CO₂e by 2030.

The National Action Plan on Climate Change (NAPCC, 2008) is one of the comprehensive policy documents of the



government outlining the strategy for addressing climate change. The NAPCC covers sustainable development, co-benefits to society at large and focuses on adaptation, mitigation, and scientific research. It mentions the steps to simultaneously advance India's development and climate change-related objectives of adaptation and mitigation. The Mission for a Green India (GIM) directly deals with enhancing ecosystem services and carbon sinks. GIM aims at afforestation of 6 million hectares of degraded forest lands and expanding forest cover from 23 to 33% of India's geographical area.

The NAPCC provided the framework for integrating climate change in sub-national plans. Subsequently, all states and Union Territories in India prepared their State Action Plans on Climate Change (SAPCC). The preparation of the second cycle of the SAPCC was initiated in 2018. The NAPCC and subsequent SAPCC led to a greater understanding of climate change among policymakers at both the Central and state levels. A similar understanding of climate change is yet to transmit to the district, block and panchayat levels.

The interpretation of the forestry target under NDC has caused some challenges due to the absence of a base year, based on which the target is to be achieved, and whether improvement in the density of existing forest and tree cover is included as an acceptable option. This is because of the occurrence of the word "additional" twice in the forestry target - once before 'carbon sink' and second before 'forest and tree cover'.

The literal interpretation of the target communicated in the NDC will mean that meeting the target cannot include forest density improvement (conversion of open forest to moderately dense forest, moderately dense forest to very dense forest and so on). Hence, the target may have to be achieved only by adding areas to the existing forest and tree cover majorly by afforestation outside forest area, i.e.

by creating new forests, and from sequestration of carbon by increasing extent of trees outside forest (TOF) comprising urban forestry, agroforestry, avenue plantation-roads, state highways, national highways and so on, including railways. This interpretation makes the target of creating an additional carbon sink slightly stiffer to achieve.

The activities that are required to be included in the strategy for creating an additional carbon sink has been identified by the FSI and can be outlined as follows (FSI, 2019a):

- (a) Improvement/Restoration of Natural Forests
 - Improving forests that have lost canopy density in the last few years
 - Improving open forests of longer vintage
- (b) Tree planting on culturable wastelands and other available lands in villages
- (c) Tree planting along - Roads (National Highways, State Highways and Other Roads)
 - Railway lines, including Railway Siding
 - Rivers & Canals
- (d) Greening of Urban Spaces
- (e) Agroforestry

The above strategy will have a maximum potential of adding 75.8 Mha of green cover as per the FSI's estimates.

Another interpretation based on an easier reading of the NDC target may imply that the additional 2.5 to 3 GT of carbon may be required to be achieved over and above the base value of the total carbon sink present in 2015.

It will be important to review the current status of the total carbon stock within forests and tree cover to discuss the pathway for meeting the 2030 target. As per the India State of Forest Report released in 2021, the carbon stock in forests and tree cover in India, as well as the change in carbon stock over the previous assessment, is as follows:

Table 28. Carbon stocks in India's forests

Type	2017 Assessment			2019 Assessment	2021 Assessment
	Carbon stock in forest	Carbon Stock in Tree Cover	Total Carbon stock (FSI, 2019 a)	Carbon stock in forest	Carbon stock in forest
Carbon stock (MT)	7,08	980	8063	7,124	7204
CO ₂ e GT	25.97	3.62	29.59	26.12	26.43



The change of carbon in the various pools over the last two assessment period is as follows:

Table 29. Forest carbon stock in various pools

Carbon in Pools (MT) as per ISFR	Above Ground	Below Ground	Dead Wood	Litter	Soil Organic Carbon (SOC)	Total
ISFR 2019	2256.5	700.8	35.8	127.9	4003.6	7124.6
ISFR 2021	2319.9	718.9	47.7	107.3	4010.2	7204.0
Increase	63.4	18.1	11.9	20.6	6.6	79.4
Increase %	2.81%	2.58%	33.24%	16.10%	0.16%	1.11%

The contribution of SOC and above ground carbon pools have been the most significant at 79.8% and 8.3%, respectively.

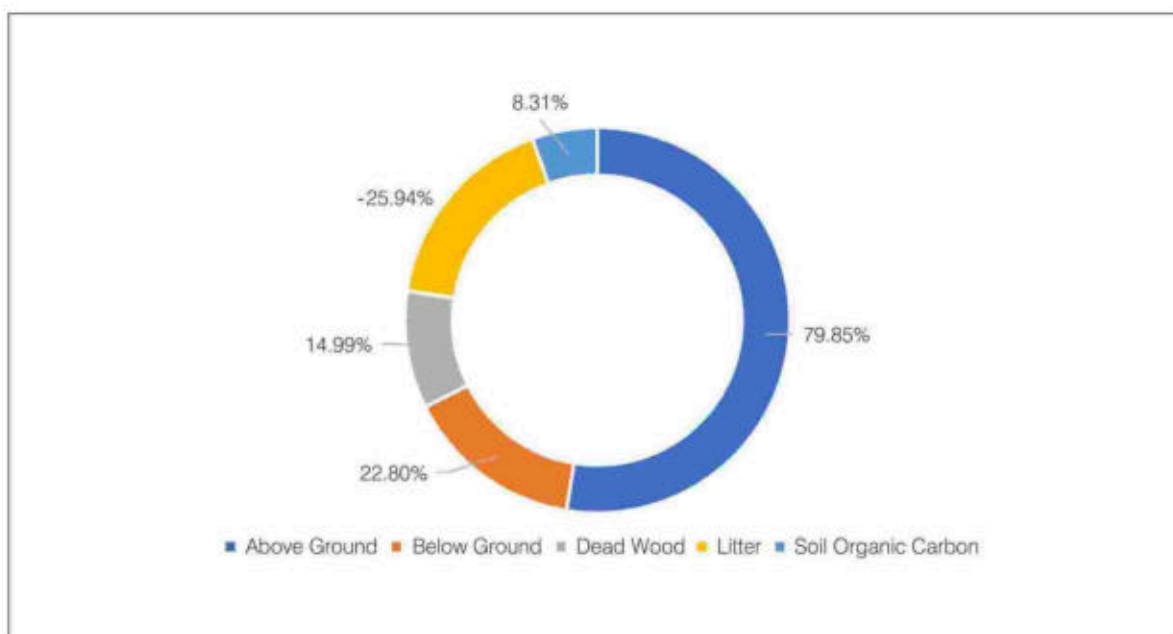


Figure 29. Contributions to change in Carbon by various pools 2019 to 2021

The total carbon in forest and tree cover has been estimated to be 29.62 GT CO₂e in 2015. With an additional 2.5 to 3 billion tonnes of CO₂e pool to be created, it means that the total carbon pool in forests will have to be in the range of 32.12 to 32.62 GT CO₂e in 2030.

Simulations of the future carbon pool based on the current sequestration rate suggest that the total carbon sink in 2030 is likely to be 31.87 GT CO₂e. The present rate of sequestration is reflective of the business as usual (BAU) scenario. This suggests the addition of another 0.25 to 0.75

GT CO₂e of carbon in the forests by 2030 to cover the gap over the BAU scenario.

In case the baseline is taken as the BAU in 2030, i.e. 31.87 GT, then the target will be between 34.37 and 34.87 GT.

However, it has also been suggested by the FSI that if the NDC target is interpreted as not being above the BAU level in 2030 (i.e. 2.5 to 3 GT above 31.87), then the increase in carbon sink by 2030 to the target level of NDC can be achieved by just sustaining the existing policies and programmes (BAU scenario).

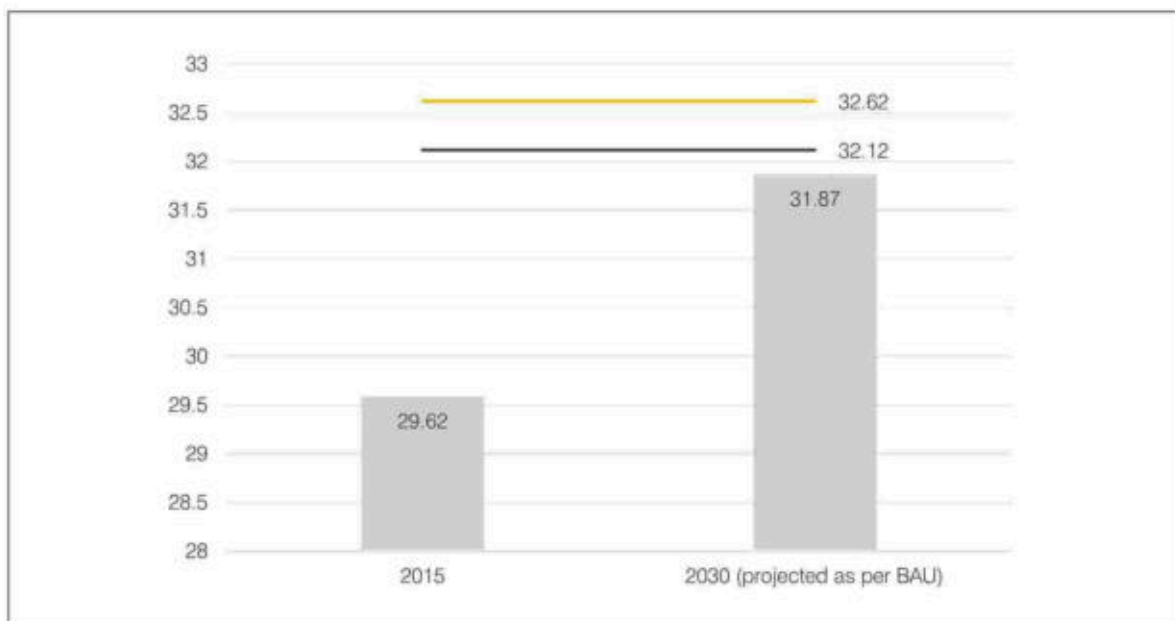


Figure 30. Distance to target if base year is 2015

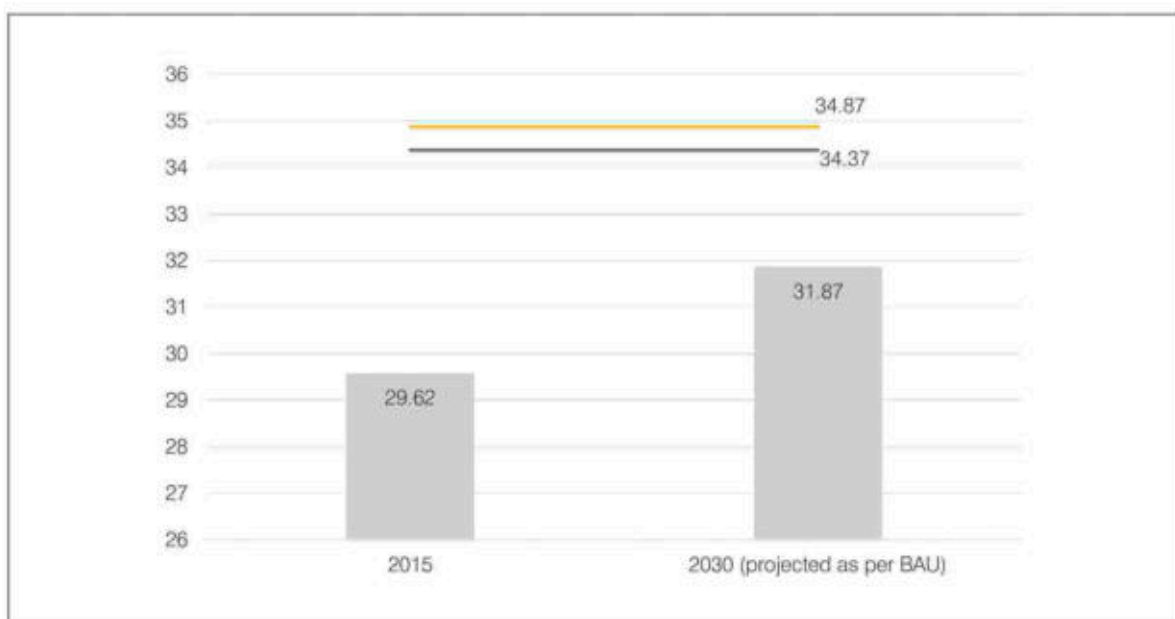


Figure 31. Distance to target if base year is BAU 2030

Meeting the lower end of the NDC target of creating 2.5 GT of sink would require 4.7 Mha of additional forest cover.

The analysis by the FSI also suggests the volume of increase in carbon stock expected under the various scenario of additional land brought under forest and tree

cover, i.e. 1.63 GT for an increase in area by 2.73 Mha; 2.51 GT for an increase in the area of 18.71 Mha; and 3.39 GT for an increase in the area of 24.69 Mha.



The increase in carbon pool is thus directly dependent on the area brought forest and tree cover. As per the FSI, the carbon stock in India's forests varies from 52 Tonne/ha (Tropical Thorn Forests) to 217 Tonne/ha (Himalayan Dry Temperate Forests), with the average at about 100 T/ha. Analysis of the

data in the ISFR released in 2019 also suggests an average annual increment of 0.3% in carbon stock in the country's forest cover. While the gradation of carbon fixed over the period of maturity of a plantation is not modelled, in a steady-state situation, to achieve the lower end of the NDC target of an additional 2.5 GT CO₂e by 2030 will mean a contribution of 0.783 GT CO₂e through the increment in the existing forests over 10 years and rest

contributed by an additional 4.68 Mha of forests created through further afforestation.

It may be mentioned that the dynamics of soil organic carbon (SOC) formation is quite complex and depends on the age of plantations as well as the depth of soil. The rate of increase of SOC in the topsoil in new plantations is initially slow or negligible due to low biomass and litter. It then increases with the increase in the age of the plantations. Research studies have shown that maintaining an increase of SOC at the rate observed in the last two ISFRs may be difficult to sustain in the future, which also means that this aspect presents risks in achieving the 2030 target. Therefore, rehabilitation and conservation of existing forests are critical for maintaining the SOC pools over the target period of NDC (Nayak *et al.*, 2020; Lei *et al.*, 2019; Bhattacharyya *et al.*, 2007; FAO, 2017).

TOF will play a major role in creation of additional carbon sink. The entire increase in area under forest and tree cover assessed in the last ISFR is contributed by TOF.

10.1.2 Analysis of the Strategy to Achieve the NDC Target

It will be important to view the BAU scenario mentioned in the above section more closely. The BAU scenario itself has been dynamic over the last decade, with various factors contributing from time to time. The overall budgetary allocations to forestry have seen changes over

this period. Pressure on forests due to encroachment and diversion have continued unabated. The available wasteland for afforestation is stagnating. The forest cover data suggests a trend of increase in low-density and open category forest areas.

Table 30. Changes in forest cover in India

Year	Area in Sq. km					
	VDF	MDF	OF	Forest Cover	Tree cover	Forest and Tree cover
2015	86,333	312,739	300,123	701,495	92,572	7,94,067
2017	98,158	308,318	301,797	708,273	93,815	8,02,088
2019	99,278	308,472	304,499	712,249	95,027	8,07,276
2021	99,779	306,890	307,120	713,789	95,748	8,09,537

Table 31. Increase in forest cover – within and outside recorded forest area

Year	GTCO ₂ e					
	Increase in Forest cover	Increase in tree cover	Total Increase in Forests and tree cover	Increase in Forest cover inside RFA	Increase in Forest cover outside RFA	Increase in Carbon per year
2019	3,976	1,212	5,188	-330	4,306	78.1
2021	1540	721	2261	+31	1509	79.4



As per the 2021 FSI assessment, only 69.96% of recorded forest/greenwash area has forest cover. The recorded forest area has, in fact, registered an increase of 31 sq. km of forest cover over the previous assessment. The overall increase of 2261 sq. km in forest and tree cover in 2021 from the previous assessment has been entirely due to an increase in tree cover outside of the recorded forest area. The investments in the forest sector both by the forest as well as the allied departments will require to be more productive in creating the additional tree cover in order to contribute to the carbon sink in the future.

The pressure on forests are also reflected in forest cover data released by the FSI over the last decade. A study by IUCN suggests that India had restored around 9.8 million hectares between 2011 and 2018 at a rate of 1.4 Mha per year, but the increase in the forest and tree cover has been only 0.16 Mha over the same period. This discrepancy can be partly explained by young vegetation not getting registered in remote sensing images. However, the fact remains that degradation of forest land due to population and development pressures continues to offset the restoration efforts that have resulted in the slow net increase in the forest and tree cover (refer to Chapter 9).

Restoration of degraded forest land, as well as promotion of tree plantations outside forests, will need to be

continued with a special thrust – which means that the business as usual scenario requires to be strengthened with additional programmes focusing on forest restoration and afforestation on all available lands. Such interventions will have to be launched without delay so as to meaningfully contribute towards the 2030 target. Improving carbon stock within the recorded forest areas will also require additional efforts to reverse the trend of forest degradation not only through reforestation but also by addressing the drivers of degradation. Non-performance on some of these aspects will increase the risks of falling behind the "BAU" as connotated in the FSI report, thus making it difficult to achieve the 2030 target.

In view of the discussion above, actions on the following aspects will be necessary to accelerate towards the target of creating an additional carbon sink in the forests as per the NDC:

- Introduce policy interventions to facilitate the private sector for plantation and restocking of degraded forests.
- Introduce adequate measures to increase the coverage of tree crops in non-forest areas as well as increase productivity by promoting high yielding varieties.
- Restriction on the extraction of forest produce, particularly fuelwood and fodder, while making alternative
- arrangements for dependent communities, to avoid forest degradation and promote better regeneration critical areas.
- Launch programmatic measures to reduce the forest dependence of local people for fodder, fuelwood and timber and stop unsustainable harvesting.
- Ensure meaningful involvement of communities through Gram panchayat-based forest governance institutions for implementing strategies to rehabilitate degraded forest land.
- Encourage industry to intensify tree planting and use better varieties to produce more wood and sequester more carbon.
- Introduce resources and technological interventions to reduce forest fires, the spread of invasive species, pests and diseases in forest areas and improve the health of forests
- Strengthen systems to collect high-quality data at higher periodicities and sufficiently local levels to help in local planning to monitor performance and increase the accountability of institutions for meeting National goals.

CHAPTER 11



Recommendations for the
Policy and Institutional Mainstreaming of SLEM



While the policy actions to tackle environmental degradation have been initiated since seventies, India's National Action Programme to Combat Desertification (MOEF, 2001) was the first dedicated action plan that suggested a number of strategies to be put in place to arrest land degradation. One of the key recommendations of the plan was strengthening of the policy and the institutional framework for the implementation of the identified strategies. Since then, a number of policy instruments have been adopted at the national level as well as by the states to deal with the depleting state of the environment and natural resources; some of which cover the issue of land and ecological degradation. The national circumstances and ecology-specific drivers of degradation have undergone a significant change since

then due to the rise in population and changes in demographics, economic growth, rising income levels and demand for natural resources. While economic development has put greater pressure on natural ecosystems, economic growth has also enhanced the national capability to mitigate some of the negative effects. The technology space has also witnessed a sea change in the two decades along with a manifold increase in India's capacity and technological prowess in some areas matching up to global standards.

This report builds on the SLEM recommendation made by the ICFRE under the previous World Bank-funded SLEM project (Annexure-14). The recommendations for the institutional and policy mainstreaming of SLEM pertaining to the key problem areas identified and presented below:

11.1 Harmonization of Data Related to SLEM

The multiplicity of data sets is one of the main problems with more than one institution publishing reports based on their assessment of land degradation status in the country. It stems from multiple definitions of degraded land, the use of different methodologies and input data of various temporal and resolutions characteristics, and the absence of actionable information for field-level implementors. It is recommended that:

- (i) A common understanding of degraded land must be arrived at, and a nodal agency must be appointed at the national level to coordinate the mapping of degraded and degrading land in the country.
- (ii) Study of land degradation should also identify hotspots at the landscape level and categorize the degraded land based on the intensity and rate of change, vulnerability and prioritization in terms of interventions required.
- (iii) The data on forest degradation should be included as part of the State of Forest report. This would clearly identify the forest land that has undergone a substantial change of canopy and vegetation cover over the last two decades.

- (iv) Digitization of forest boundaries should be completed on priority across all States/UTs.
- (v) Similarly, mapping of wetlands should be carried out and results be compared with the baseline data of the last assessment done in 2013, identifying the change in the on-ground status of wetlands and water bodies in the country.
- (vi) A web portal with information on degraded land based on the study should be developed and made available to everyone, including implementers, managers and researchers. The portal should have information, preferably at the parcel level, for quality planning.
- (vii) Inconsistencies in data published by various organizations should be identified and rectified/explained by the nodal agency. For example, inconsistencies in the extent of saline areas in the northern part of the country have been highlighted by stakeholders in the various studies conducted by research institutions of the country.

A consistent data set of high reliability made accessible to all will go a long way in improving the planning of interventions, timely monitoring with the use of IT systems and instil accountability.

11.2 Addressing Issues of Soil Health

Depletion of soil health is one of the primary outcomes of land degradation. Protecting soil health through better

agronomy practices is one of the main prescriptions for addressing land degradation of cultivated areas. Action



recommended are as follows:

- (i) Intensifying the mapping of soil health and integrating it with the application of soil amenders and fertilizers.
- (ii) Assessing and mapping of areas vulnerable to degradation and developing local level plans to tackle the same.
- (iii) Disseminating and adopting SLEM best practices identified by the ICFRE to a wider audience.
- (iv) Taking up innovative programmes to restore soil health, such as wider application of biochar and development of Land Resources Inventory.
- (v) Making concerted efforts to reclaim problem lands by the adoption of scientific methods to prevent further degradation and increase productive or ecological value from the land.
- (vi) Studying the effect of inputs and output subsidies on soil health.
- (vii) Mapping the carbon in forest areas, including in forest soils at higher intensity, and creating a credible database for future use as a baseline.

11.3

Protection and Restoration of Degraded Lands

Specific interventions in critical and vulnerable land use classes will be required to restore and arrest further degradation and meet specific commitments in achieving LDN. The main recommendations in this regard are as follows:

- (i) Restoring the 30 Mha of degraded forest land so that their ecological functions are restored, and they are able to provide usufructs to communities on a sustainable basis. While the state forest departments have been practising afforestation and soil and moisture conservation works in forest land, most of these areas continue to be impacted by severe biotic pressure. Thus, restoration of such areas has remained a challenge.
- (ii) Restoring grassland and grazing land; the concept of rotational grazing has in many cases not been effective, and some of the more degraded grasslands will require rest to recoup their productivity.
- (iii) Addressing the livelihoods dependency and development aspirations of communities residing in the forest fringe villages, which will alleviate some of the pressures and provide the natural space for the forests to recoup their health.
- (iv) Taking up technical interventions to improve the productivity of forest areas through better selection of planting material in the afforestation programmes.
- (v) Developing and implementing a strategy for addressing the issue of invasive species, which cover a huge part of the forest areas affecting regeneration of native species, yield depletion and reducing their ecological value.
- (vi) With the growing impact of temperature rise due to climate change, fires have started to emerge as a key threat to the forest, especially in areas like the Himalayan region and Central Indian landscape. More focussed approach for addressing forest fire through the use of modern knowledge and tools is an important strategy for the future.
- (vii) Protecting the health of rivers and wetlands to maintain them as healthy ecological units.

11.4

Strengthening of Institutions for Tackling Sustainable Management of Land

Institutions are one of the most important tools for furthering the agenda of sustainable land management. One of the biggest casualties of dysfunctional institutions or institutions working with suboptimal capacities is the malmanagement of common resources. The key recommendations in this aspect are:

- (i) An institutional mechanism is required for implementing projects where more than one department is jointly working or are expected to work with interventions on multiple sectors, such as the improvement of forests and grazing lands, animal husbandry, horticulture, agriculture watershed development, soil conservation and livelihoods. Also, it is important to develop a mechanism for a common planning tool for the MGNREGA projects to enhance utility and scientific rigour in land-related works done under the programme.
- (ii) A mechanism to set department wise targets as well as conduct monitoring with the objective of achieving LDN is required, given that achieving LDN will be more than just afforestation or development of degraded forest land.



- (iii) An institution to collate and disseminate knowledge and best practices for sustainable land, biodiversity, water management and agroforestry to various stakeholders.
- (iv) Strengthening of government or statutory institutions, such as State Biodiversity Boards, which are able to increase their reach to handhold and support community institutions to inventorize and manage bioresources, and water user associations for participatory management of groundwater.
- (v) Development of a carbon market to enable the flow of funding from the private sector for SLEM and addressing climate change-related issues.
- (vi) Revival of land use boards to act as a coordinating body in planning for land use at the state level, which takes a balanced and judicious approach to both development and ecological imperatives.
- (vii) A mechanism for monitoring SDGs in the context SLEM.
- (viii) Closer integration of the Panchayati Raj Institutions in SLEM.

11.5 Incentives, Disincentive and Enforcement to Tackle Land Degradation

The response of communities and institutions to the policies and regulations related to the natural resources define the pathway the resources take, and in larger time frames are one of the main causes for their depletion. A deeper understanding of the causes and effects of the incentive regime, alternate options that are more natural resource friendly and support sustainability and empathetic change management from the current regime to a new one is required. It is recommended that:

- (i) Pricing of water should be slowly introduced in all sectors, including agriculture. The price should reflect both the value of the resource as well as the cost of extraction and delivery.
- (ii) Disincentivizing the overuse of ground water in

agriculture, which is leading to the depletion of the non-replenishable stock of groundwater.

- (iii) Developing an incentive mechanism to promote investment in land protection.
- (iv) Activities like mining, including sand, and other building materials should be brought under stricter enforcement and compliance.

Certain changes in the policy regime will be required to implement these recommendations. In addition, while moving away from the business as usual regime, the disproportionate impact on the poor and vulnerable will need to be softened through innovative mechanisms for targeting relief, which is possible now with better quality socioeconomics data available for individuals and businesses.

11.6 Addressing Community Development Needs

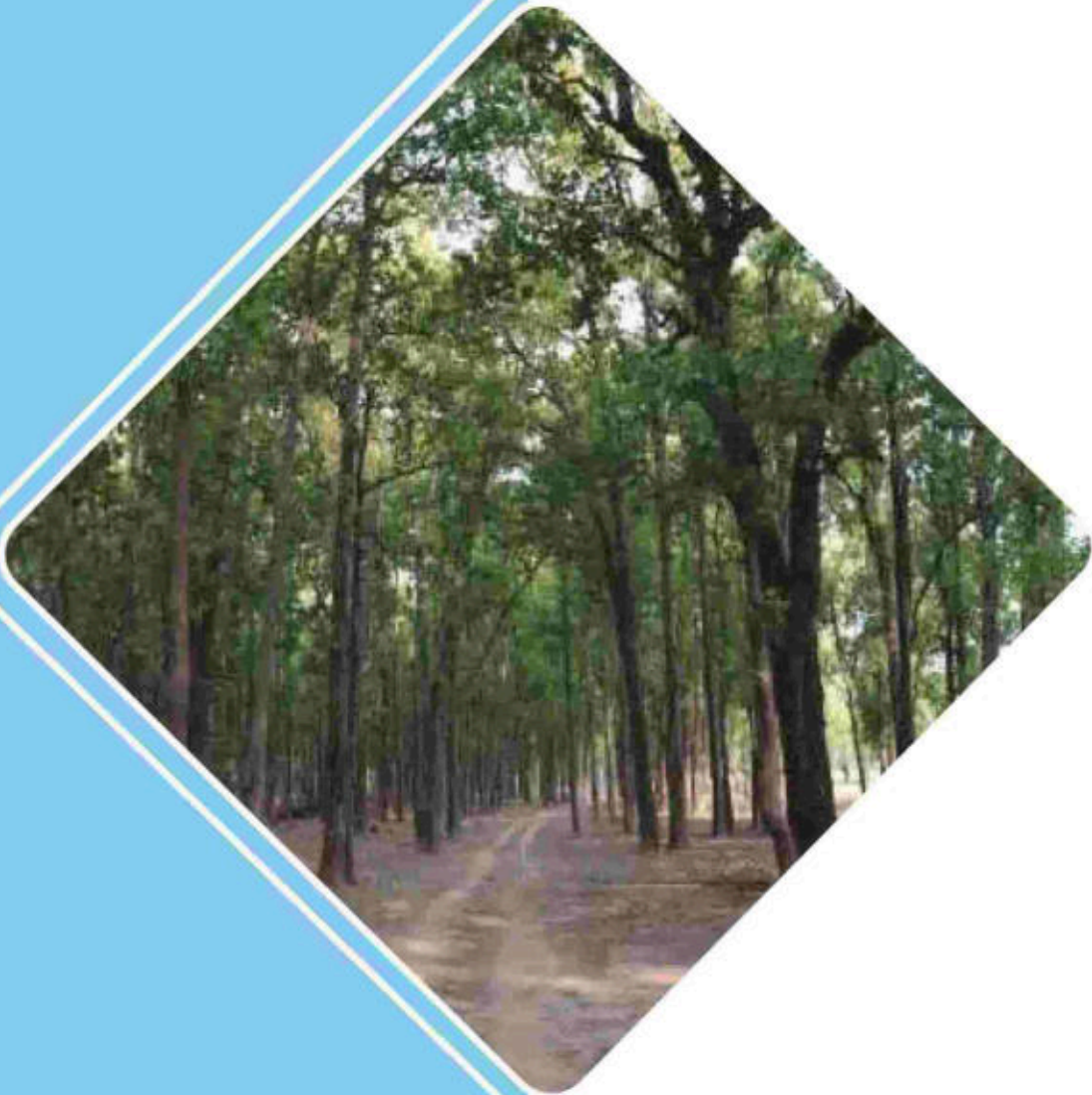
There is a direct relationship between deprivation and vulnerability in livelihoods with unsustainable use of natural resources. As discussed in the previous chapters, while economic development has uplifted a huge number of people out of poverty, dependence on subsistence livelihoods, especially in and around forests, has continued to be a reason for forest degradation. Similarly, small and uneconomic landholdings, tenure structure and inefficient targeting of beneficiaries have been some of the causes of low investment in scientific land management. Recommendations to address issues in this context are as follows:

- (i) Focused development of forest fringe villages, including areas where pattas have been given to people under the FRA. Since the dependence of this section of society is the highest on forest land and biodiversity resources, speedier upliftment of the people out of subsistence will go a long way in the

recovery of degraded forests.

- (ii) Strengthening of SLEM related interventions so that community participation is meaningful and decisions taken on the ground benefit a wider set of people, while also improving the legitimacy and acceptability of such decisions taken.
- (iii) Women as a group are an important stakeholder and interest group in the management of natural resources. Thus, gender mainstreaming in SLEM related programmes should be taken up.
- (iv) A large number of women are categorized as women farmers, but most of them are not title holders of such land. This affects the kind of decisions women can take, especially in the areas of protection and sustainable land use of their landholdings.
- (v) Implementation of PESA.

CHAPTER 12



Roadmap for the Policy and Institutional Mainstreaming of SLEM



Effective and result-oriented implementation of the recommendations will require the identification of suitable instruments and nodal agencies that can champion the key interventions areas. The instruments

identified for giving shape to recommendations will fall under (i) policy interventions, (ii) development and implementation of schemes and (iii) disincentives, regulations and enforcement.

Table 32. Instruments for Institutionalizing SLEM

Instrument for the implementation of strategy and roadmap	
Policy interventions	Integrated policy on land addressing land degradation
	Increasing funding for forestry programmes
	Strengthening Forest Policy
	Enabling ecosystem for growing trees
	Diversion of forest land- improving monitoring and assessing impact post land diversion
	Arriving at a consensus definition of wasteland/ degraded land
	National Carbon Market
	Policy on development of grasslands and grazing lands
	Subsidy specific study on agriculture
	Linking National Water Policy to land and water
	Legislation on ecological flows in rivers
	Revival of Land Use Boards
	Implementation of schemes and programmes	Focus on development of forest fringe villages
Mapping degradation in forest lands	
Scheme for digitization of forest maps	
Campaign for improving planting stock in afforestation programmes	
Digitization of forest maps	
Prioritization in afforestation on degraded forest land	
Improving the quality of planting material in afforestation programmes	
Interventions to reduce fire, invasive species, pest and diseases in forest areas	
Forest Carbon Assessment	
Collaboration with Research Institutions	
Focus on wildlife corridor development	
Strengthening State Biodiversity Boards	
Mapping and protection of wetlands	
Target setting for LDN	
Framework to monitor LDN	
Develop Centre of Excellence on Sustainable Land Management	
Develop a specific project on SLEM at the national level	
Greening of highways	
Focussed attention on rehabilitation of mined out and abandoned mines	
Encouraging the involvement of students in fighting land degradation	
Establishing a mechanism for measuring SDG indicators related to SLEM	



Instrument for the implementation of strategy and roadmap	
	Special scheme for development of grasslands and grazing lands
	National portal on agroforestry
	Incentives for investment in land protection
	Participatory and decentralized groundwater management
	Common planning tool for MGNREGS and Watershed Projects
	Special provision in MGNREGA for tribal and Forest Fringe Village areas
	Integrating SLEM with GPDP
	Standing Committee on Land Management in Panchayat
	Strengthening community participation in SLEM programmes
	Gender mainstreaming in SLEM policies and programmes
Disincentives, regulations and enforcement	Addressing needs of women farmers in the implementation of SLEM
	Management of village common property resources
	Implementation of PESA
	Enforcement of sand mining guidelines
	Disincentivizing overuse of water in agriculture

The recommendations have been described in greater detail in the following sections, along with their justification. As the case may be, the key institutions at the national and

state levels are also identified as the primary stakeholders for implementing the recommendations.

12.1 Action Points for Forest and Environment Sector

12.1.1 Integrated Policy on Land Addressing Land Degradation

Justification: The issues that impact land degradation and conservation of ecosystems are enshrined in a number of policies, such as the National Forest Policy 1988, National Agriculture Policy 2000, National Environment Policy 2006, National Farmers Policy 2007, National Water Policy 2012, National Agroforestry Policy 2014 and National Mineral Policy 2019. However, the need to address land degradation has only been mentioned as

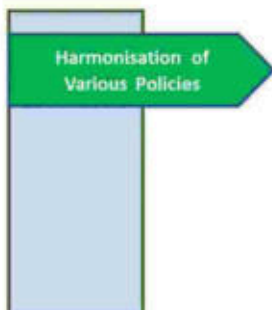
one of the aims in the passing reference while the policy remains focused on their core sector agenda. In a combined manner, the issue of SLEM does not rise to the level of importance that it ought to. Thus, there is a need for a dedicated policy on land degradation in the country.

Measures related to land are spread over many departmental policies.





Integrated Policy to Address Land Degradation



- A harmonized policy on sustainable land management to bridge National Forest Policy 1988, National Agriculture Policy 2000, National Environment Policy 2006, National Farmers Policy 2007, National Water Policy 2012, National Agroforestry Policy 2014 and National Mineral Policy 2019.
- Policy to address components of ecosystem viz. land, water, vegetation and biodiversity as well as land use like agriculture, forestry, waterbodies and mining.
- Harmonization of sectoral policies should enunciate key principles for land use which would be non-negotiable and co-opted by respective sectors in view of the challenges of land degradation, arrived at based on analysis of scientific and socio-economic data.
- Strategy for implementation of the policy prescriptions should be a part of the policy.

Action to be taken by the Ministry of Environment, Forest and Climate Change in coordination with the Ministry of Agriculture and Farmers Welfare and Department of Land Resources.

12.1.2 Strengthening Forest Policy

Justification: The National Forest Policy 1988 has remained a sectoral policy so far, although many aspects of forest conservation depend on sectors outside forests. The forestry sector in the country has also evolved over the last three decades due to a deeper understanding of the role of forests in providing live sustaining ecosystem services, combating climate change, and addressing the vulnerability of rural communities. Strengthening the

baseline data on the country's forest resources is much needed as the effects of climate change are set to become more pronounced in the coming decades. The international landscape related to forests has also changed substantially after the 1992 Earth Summit.

Forest policy needs to respond to future expectations particularly in the areas of climate change, sustainability of ecosystem services, and livelihood sustenance.

Strengthening Forest Policy



- A more holistic valuation of forest based on the value of land, ecology and ecosystem services be given a policy backing.
- Environmental value of carbon sequestration, and sharing such benefits with communities.
- Implementation of REDD+ mechanism as mode of financing.
- Contribute to increase in tree cover outside forest area by creating an enabling environment so that target of 33% tree cover is reached in the next 2 decades.
- Play a significant role in production of wood and development of domestic wood-based industries, reduce imports and better utilization of wood through use of technology.
- Incentivise community involvement in forest conservation.
- Address dependence of communities on forest ecosystems, collaborative action with other sectors like agriculture, tribal and rural development.
- Enhance green spaces in urban areas and integrate with the long-term trends of urbanization.
- Mapping of forest degradation
- Enhancing funding for restoration of degraded forest land including through private participation.
- Strengthening forest research specially in view of the effects of global warming on forests and the need for maintaining their health so that they are able to sequester carbon optimally.

Action to be taken by the Ministry of Environment, Forest and Climate Change.



The role of the judiciary has also been critical in defining the boundaries and limitations of the country's legislation related to forests and wildlife. The definition of "forests", the concept of NPV in case of forest land diversion, the importance of removing encroachment from forest land, implementing the FRA, regulating forest-based industries and its linkages to sustainable wood production in the country, stressing the inviolate

nature of protected areas, improving scientifically determined mapping and assessment of forest land and forest cover are some of the aspects where judicial pronouncements have made a paradigm shift in forest governance. So far, these interventions have been mostly reactive. Therefore, the next generation policy for the forest sector has to be futuristic and should take care of the evolving needs of society.

12.1.3 Increasing Funding for Forestry Programmes

Almost all the funding in the development of forests are largely committed through public money channelized from the Central or state government schemes. Funding for this sector at the Central level has remained around Rs 8 to 9 bn, whereas that of the states combined is at about Rs 200 bn. The amount available for works from the state's allocation is about 40% of the total, the rest being spend on the establishment.

On the other hand, the challenges in addressing degradation in forest areas are immense. About 30.7 Mha of forest land are categorized as open forest, i.e. having a canopy density between 0.1 and 0.4. Another 4.6 Mha of land falls under the category of scrub, having a canopy density of < 0.1. Degraded forest constitutes a significant proportion of these forest categories. Restoration of such land has remained a long-term challenge, both from the perspective of finding resources as well as the local community overburdening these areas due to resource dependency.

Resources are required to reverse forest land degradation.

Commercial forestry in government forests was attempted through Forest Development Corporations (FDC), which were created after the recommendation of the Agriculture Commission in 1970 to apportion part of the forests for commercial plantations. Only a few out of the 19 FDCs

engaged in timber-related operations are barely revenue surplus today. Thus, this source of funding has also not proved sustainable.

Justification: The budgetary allocation of the central and state governments has been inadequately low, given the dependence of people on forests and the extent of the degraded area that is required to be restored. Some states that have significant forest resources are particularly dependent on Central funding. Augmentation of funds from other sources apart from budgetary allocations is also required.

Letting the forest land remain degraded or degrading is a huge opportunity loss. Funding is more particularly required to address some critical aspects of forestry, i.e. enhancing technical capacities for planning and monitoring, improving quality of planting material used for afforestation, fighting forest fires and eradicating invasive species. Additional funding will also be required for meeting the NDC commitment of an additional 2.5 to 3 GtCO₂. Moreover, as the country's GDP grows, and along with it resources collected in the form of tax and non-tax revenue also grows, the investment by the state in protecting and growing its natural capital should also increase.





Action to be taken by the Ministry of Environment, Forest and Climate Change.

12.1.4 Focus on Development of “Forest Fringe Villages”

Forests play an important role in the lives and livelihoods of people, especially those living in the forest fringe villages – defined here as villages within 5 km of the boundary of demarcated forests⁷⁰. Extraction of firewood, small timber and grazing beyond the carrying capacity of forests has set in a slow process of forest degradation. With continued degradation, the capacity of the forests to provide usufructs to communities has also reduced.

Consciously reducing dependencies of people living in the proximity of forests is absolutely necessary to reverse forest degradation.

The forest fringe villages also face difficulties due to the inaccessibility, located far from local towns and administrative centres. Inaccessibility leads to challenges in accessing services and markets. In general, these areas, due to their circumstances, remain a step behind in the development cycle.

FFVs also comprise FRA lands, which are of lower land capability and often less productive than Category I and II agriculture land. These areas will require sustained soil and moisture conservation and improvement of fertility to maintain or enhance productivity. Compatible land use will also help to prevent the reduction of land productivity.

Justification: It is well-understood that the deprivations of communities living around forests lead to their over-dependence on the forest resources fuelling a nexus of poverty and land degradation. Experience has shown that investment in the development of forests, while the community around it remains poor and deprived, has not helped restore forests. The amount of investment in forestry activities is also not enough to provide significant and sustained income to people. Although government-funded developmental programmes are implemented in these areas, they face challenges given the remoteness, inaccessibility and de-prioritization of these regions.

Less vulnerable communities with reduced dependency on forests for survival will provide the opportunity for forests to recoup. Although programmes of both central and state governments related to agriculture, livelihoods, and employment are also being implemented in the FFV areas, given the direct connection of forest protection with the security of livelihoods, there is a need for special effort towards the holistic development of these areas. A specific scheme for the development of FFVs is recommended.

Low digitization hinders forest department's ability to plan and monitor its activities better.

⁷⁰ Co-opted from the ISFR 2019



Action to be taken by the Ministry of Environment, Forest and Climate Change in coordination with the Ministry of Rural Development, the Ministry of Agriculture and Farmers Welfare, the Department of Animal Husbandry and Dairying and the Ministry of Skill Development

12.1.5 Strengthening Forest Management

Maintaining forest cover and health is one of the primary goals of the forest departments. Restocking of forests through afforestation, in addition to assisting natural regeneration, is an important method of rehabilitation of

forests that have lost tree cover. Initiatives to improve the outcomes of afforestation and reforestation activities which are recommended, are described below.

12.1.5.1 Strengthening Forest Management

RS and GIS are potent tools for effective forest management, both for planning and monitoring. Digitized maps of high quality are one of the pre-requirements to fully use the potential of such GIS-based tools.

Justification: Most of the states have embarked on digitization of their forest boundaries. However, the status of digitization is not uniform throughout the country. Digitization of toposheets has been done by the Survey of India. Land records in states, including cadastral and village maps, are being digitized and geocoded as part of the Digital India - Digital Land Records Modernisation Programme (DILRMP)

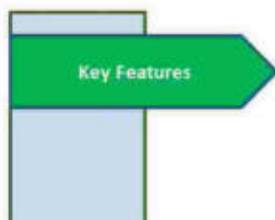
programme of the Department of Land Resources by the state revenue departments. While the outer boundary of forest and revenue are coterminous, internal boundaries like beat, compartment, and blocks are available only with the forest department. In many instances, the boundaries are not clear with respect to private or other government common lands, making mapping difficult. The infrastructure and capabilities across also vary substantially, affecting the quality of digitization of forest boundaries. In many places, boundary disputes with contiguous landowners have also caused impediments in the preparation of accurate maps.



Due to the non-uniform status of digitization, the benefits of the use of GIS in planning or monitoring as well as portals,

such as those developed by MoEFCC at the national level, cannot be fully realized.

Scheme for Forest Land Digitation



- Assess work already done by states on digitization of forest land.
- Develop quality and technical standard.
- Fund states for digitization of maps.
- Support development of GIS/ mapping units in States bases on best practices in using technology for forest management.
- Develop portal for digitized forest maps, digitize working plans.
- Invest in capacity development.

Action to be taken by the Ministry of Environment, Forest and Climate Change and the State Forest Departments

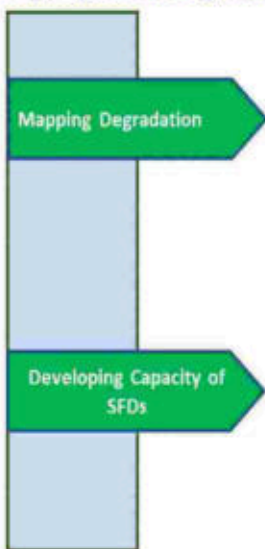
12.1.5.2 Prioritization in Afforestation on Degraded Forest Land

Justification: While the FSI maps the change of area within density classes, i.e. VDF, MDF, OF, Scrub and Non-Forest, the information from the change matrix does not indicate the degradation that may be occurring within the density classes itself. For the change to be evident, mapping of reduction in canopy cover within a particular density class would be very helpful. The identification of areas that were forests of higher density and have now lost forest cover can be critical for the prioritization of target areas for afforestation and ANR.

Frontline field staff conduct the ground survey of the forest before initiating reforestation, but historical perspective is not always available due to the change of staff and absence of proper documentation. The use of remote sensing-based assessment can therefore become an efficient tool for the prioritization of areas for afforestation based on the historical change in density.

Targeted afforestation would be more successful.

Mapping Forest Degradation



- Mapping of patches of size 20 ha or above with demarcated forest which have lost canopy density in the last 10-15 years.
- Aim would be to map discernible changes within high density class or from a higher density class to a lower density class, along with the changes over such timeline.
- This will help in clearly identifying areas which were capable of having a higher density of trees and are now relatively open. Such areas would be ideal for carrying out afforestation.
- Assessment can be either done nationally or the State Forest Departments should be able to develop the capacity to conduct such mapping at their level.
- The data should ideally be available for the compartment-wise so that the information becomes actionable for the field teams to plan afforestation activities.
- To facilitate wider dissemination and use of information, the information may be provided on an online GIS portal with the facility to download maps in the form of vector polygons.
- Wrong site selection could be avoided and funds for afforestation could be utilized more effectively.

Action to be initiated by the Ministry of Environment, Forest and Climate Change, the Forest Survey of India and the State Forest Departments



12.1.5.3 Improving the quality of planting material in afforestation programmes

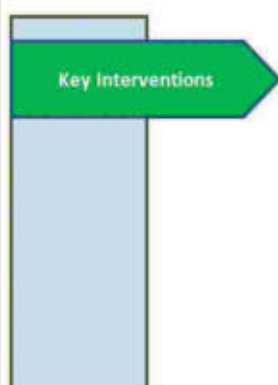
Justification: Afforestation and ANR are the key interventions taken up in forests for the improvement of stock. Over 10 Mha of plantations have been created from 2011 to 2018 in the country. The overall productivity of forests in India is poor compared to global benchmarks (0.7 cum/ ha/ year compared to the world average of 2.1 cum/ ha/ year⁷¹). The main reasons for low forest productivity include poor land capability, silviculture practices and seeds of unidentified and low-quality origin used to raise plantations.

Forest tree species being slow-growing and of long rotation, research in improving forest tree quality has not

been as successful as in agriculture. Also, for similar reasons, private sectors are not incentivized to research forest species. Due to large-scale plantations being done inside the forests in the country, the risks of reducing the quality of species in planted forests and its future impact are incredibly high.

Forest departments have taken up the development of quality planting material sporadically, but there is a need to put special focus on this aspect in mainstream afforestation programmes.

Campaign for Improving Quality of Planting Stock in Afforestation Programmes



- Assess and consolidated research work already done by ICFRE institutes and others on Improving quality of planting stock.
- As part of the project, create a National Database of Candidate Plus Trees (CPT) for better record and access.
- Capture institutionalized knowledge available with local officials through the portal
- Assess demand and supply gap of quality planting stock.
- Review the status of seed stands, seed production areas and seed orchards created over the last few decades and make an inventory of the same.
- Register suppliers of forest trees bring them on one platform and work with them to maintain chain of custody/ certification of seeds collected.
- Establish a mechanism for seed certification.
- Rejuvenating the research wing of forest departments after a management audit.

Action to be taken by the Ministry of Environment, Forest and Climate Change and the State Forest Departments

12.1.5.4 Interventions to reduce fire, invasive species, pests and diseases in forest areas

Justification: Forest fires, invasive species, pests and diseases cause serious impacts on forest biodiversity. The intensity of these threats is expected to increase due to the effect of climate change. Technological interventions have been introduced in recent times to manage threats like forest fires. However, these systems are still not adequate for countering forest fires that affect some states severely.

The spread of invasive species is another problem that has exacerbated the problem of forest health. This is

further compounded due to the increasing degradation of forest land in the fringe areas.

As the increase of temperature due to global warming by 1.5° C in the next 20 years and 2° C by 2050 becomes almost certain without substantial reduction in GHG emissions, the overall increase in temperature will extend the fire season and exacerbate the problem. There will be increased chances of drought in forest areas. With trees exposed to more drought and fires, the chances of attack by pests and pathogens also increase.

⁷¹ Source FAO, 1989



Forest health from the aspects of pests and diseases have not been given adequate attention. Most of the eruptions of pests and diseases are local in nature and subside in due course. However, sometimes they do cause massive losses, as in the case of sal borer attacks in MP forests. Assessment of pests and diseases in forests has to be done as part of the preparation of working plans but tracking the spread of forest pests and diseases has been absent as part of routine forest management.

This calls for special and enhanced attention to address these issues of forest health. The forest protection scheme being implemented by the MoEFCC should be strengthened to address these challenges. The MoEFCC can also take the lead in bringing these aspects of forest management back into focus.

Risks of damage to forests due to forest fire, pests, invasive species, and drought will further increase due to global warming.



Action to be taken by the Ministry of Environment, Forest and Climate Change and the State Forest Departments

12.1.5.5 Forest Carbon Assessment

Justification: Carbon sequestered in forests is one of the most important carbon sink changes of which in its accumulation and decomposition, stabilization and destabilization directly affect atmospheric CO₂ concentration and play a significant role in the global carbon cycle. Forest carbon is also an indicator of forest health.

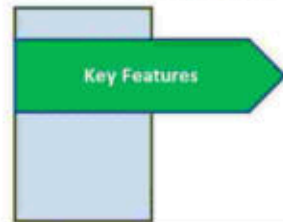
Quality database is required for measurement of impact due to climate change.

Contributions of forests towards climate change mitigation is an important action point in the country's NDC. Monitoring of forest carbon at the local level is increasingly becoming important because it will not only enhance the

quality of data for forest carbon accounting, but also help in monitoring forest health and its role in climate change mitigation. Currently, while carbon in forests is measured periodically by the FSI as part of the State of the Forest Report, longitudinal assessment of changes in forest carbon both above and below ground from the same sites are not possible as permanent grids for measurement of forest soil carbon does not exist in all districts. As the impacts of climate change are becoming increasingly evident, there is a need to prepare localized datasets at the district level to refine climate modelling and projections at the district level.



Forest Carbon Assessment Programme



- To be carried out across the country.
- Localized data sets of forest carbon sink, valuable baseline for future assessments.
- Trend analysis over long term would be possible for management units in forest administration.
- Enable monitoring outcomes of forestry programmes from another dimension.
- Local agencies to be developed to carry out this exercise based on standard procedure and methodology.

Action to be taken by the Ministry of Environment, Forest and Climate Change and the State Forest Departments in collaboration with research institutions and universities

12.1.5.6 Collaboration with Research Institutions

Justification: The technologies developed both by the ICAR and ICFRE are very pertinent to SLEM. Discussions with stakeholders brought out the fact that despite a lot of know-how coming out of these institutions, the knowledge is not getting mainstreamed and is not percolating to the field during the formulation or actual implementation of projects. Almost all policies and guidelines reviewed discuss convergence with research agencies; however, collaboration with scientific and research institutions has remained an area of weakness.

Work done in the areas of grassland research, reclamation of saline and waterlogging affected land, sustainable

development in the Himalayan region, rejuvenating rivers and spring sheds, control of invasive species, agroforestry models, and many other SLEM best practices being undertaken by specialized institutions need to be mainstreamed and upscaled. It can be achieved by involving the institutes more closely in programmes through design, training and advisory support. Besides, the feedback on technology, know-how and appropriate costing from research findings may be incorporated in the national and state-level programmes.

Collaboration with research institutions could be one of the early gains transforming sustainable land use in the country.

Collaboration with Research Institutions for SLEM



- Closer liaison with ICAR and ICFRE institutions in ongoing programmes and schemes, so that the research outputs related to SLEM can be mainstreamed.
- Involving Institutions at the stage of project design.
- Enabling knowledge sharing with field units, creating mechanism for collaboration and providing scientific guidance.
- Frameworks and modalities to be developed and agreed between institutions and line departments of each State, Govt. of India Ministries to facilitate.
- Reducing time lag between research and piloting in the field.
- National schemes to have a component for technology demonstration.
- Costing based on solutions standardized by research institutions need to be reflected while preparation of schemes and implementation plans.

Action to be taken the Ministry of Environment, Forest and Climate Change and the Indian Council for Forestry Research and Education



12.1.6 Biodiversity Conservation and SLEM

12.1.6.1 Focus on Wildlife Corridor Development

Justification: India has 903 Protected Areas covering an area of 16.5 Mha of area. Degradation of forest landscapes and wilderness areas outside forests poses a major threat to the conservation of wildlife, especially the long-ranging species. Many of the erstwhile large wildlife habitats have been fragmented, separating populations and gene flow, and are also the reason behind the increased human and animal conflict. An estimate suggests that almost three quarters of land have been disturbed by humans from their natural state. A substantial amount of research in this aspect is already available.

Funding under certain the Central Sector Schemes, such as Integrated Development of Wildlife Habitat, Project Tiger and Project Elephant, and other state schemes, has been

available for corridor management, but the funding may be inadequate given the proportion of the problem.

The need for corridors as part of the Tiger Management Plan has been recognized in the Wildlife Protection Act 1972 as part of the larger set of the amendment on the National Tiger Conservation Authority in 2006. While identification and mapping of corridors in Tiger Reserve areas are being done systematically, the same needs to be extended to other wildlife conservation areas as there exists a large gap in the management capabilities between protected areas other than Tiger Reserves vis a vis the Tiger Reserves, which affects the capabilities of the lesser-known PAs to manage corridors.



Action to be taken by the Ministry of Environment, Forest and Climate Change



12.1.6.2 Strengthening State Biodiversity Boards

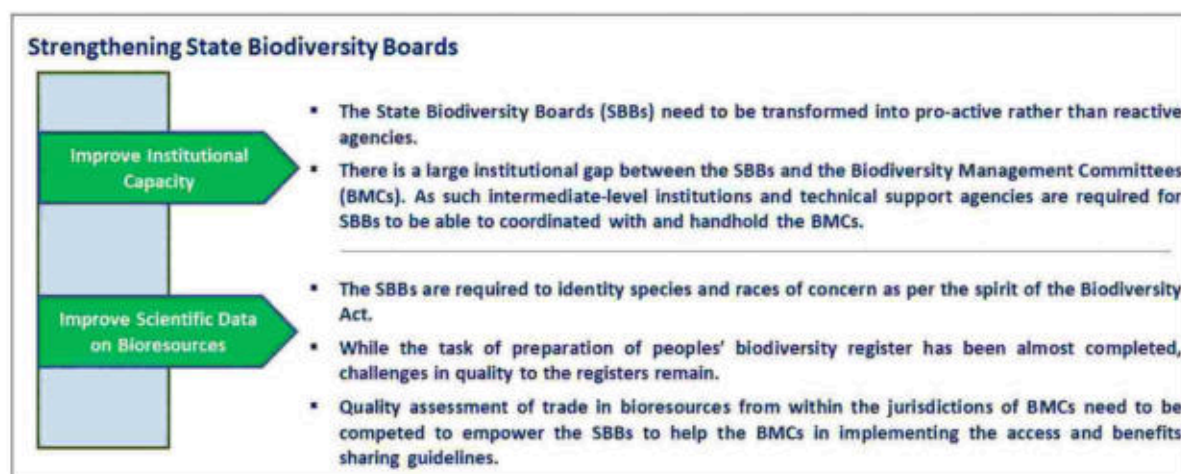
The role of State Biodiversity Boards (SBB) is very critical in taking forward the agenda enshrined in the Biological Diversity Act. Their role is paramount in providing support to Biodiversity Management Committees, inventorizing biodiversity, and science and data-based recommendations on sustainable use of bioresources. The SBBs are also entrusted with regulatory powers for granting approvals for bio-survey and bio-utilization to the citizens of India, whereas foreigners have to obtain such permissions from the NBA.

Benefits from bioresource should reach communities and SBBs are the main agency to make this happen.

Notwithstanding the fact that the AYUSH market in India is estimated to be \$5.7 bn in 2020, with the Indian herbal industry alone being estimated at \$578 million and India's export in 2017 to be \$330⁷² million of raw herbs, the benefits to the community in the form of Access Benefit Sharing has

been meagre. The conservation status of many of the commercially valuable tradable bioresources has also not been scientifically assessed. There is also the absence of a mechanism to monitor the status of such resources, so that their vulnerability can be assessed before they reach the threshold of being endangered. The BMCs or gram panchayats, in practice, have not been able to measure up to the responsibility of conservation of commercially valuable bioresources found within their area.

One of the main reasons for this is because institutionally SBBs are very weak with limited scientific staff and financial resources. Besides, most of the SBBs have been organically attached to the state forest departments, and they tend to limit their work on forest biodiversity, whereas an equal amount of effort is required in the areas of documentation and conservation of biodiversity in the non-forest flora and fauna. The strengthening of SBBs is therefore critical to enhancing biodiversity governance in the country.



Action to be taken by the Ministry of Environment, Forest and Climate Change and the National Biodiversity Authority

12.1.6.3 Mapping and Protection of Wetlands

Justification: Wetlands play an important role in the conservation of aquatic flora and fauna, environmental protection and water conservation. Wetlands also contribute immensely to the livelihood and food security of people.

The National Wetland Inventory and Assessment was conducted by the ISRO SAC between 2008 and 2013. The FSI has also started publishing the extent of wetland under the forest areas. However, an updated

⁷² <https://pib.gov.in/Pressreleaseshare.aspx?PRID=1558955#:~:text=India%20exported%20USD%20330.18%20Million,12.23%25%20over%20t e%20previous%20year.>



inventory of wetlands and water bodies at the local or regional level is not available. Many of the wetlands mapped earlier could have vanished or been put to other land uses, and a number of them would be under severe threat of being obliterated.

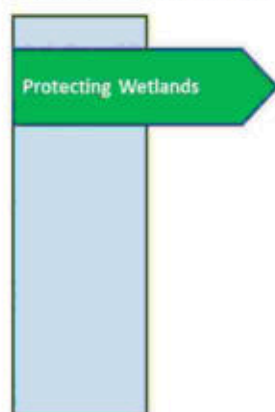
The Wetlands (Conservation and Management) Rules, 2017, has specifically delegated powers and functions to the state governments and UT administrations for the demarcation of wetland boundary supported by digital maps, its zone of influence and land use and land cover

thereof. This exercise is the primary step for the inventorization of wetlands so that necessary measures can be taken for their conservation and prevent encroachment, or draining out, or being put to other uses.

The State Wetlands Authorities are at the initial stages of functioning and will require consistent support to be institutionally relevant.

Multiple uses and multiple agencies have made wetland conservation a challenge.

Mapping and Protection of Wetlands



- **Strengthening State Wetland Authorities**
- **Mapping of wetlands and their zone of influence along with their drainage to be completed in a time-bound manner.**
- **Critical to include smaller wetlands which are not under any existing conservation programme.**
- **Support for mapping and inventorization may be provided by the Central government.**
- **Responsibility of protection to be given to the owner of the land on which the wetlands exists to ensure that they are in good health.**
- **A periodic water quality monitoring mechanism may be set up.**
- **The demarcated wetlands may be tagged with revenue survey numbers and diversion of the same should not be allowed.**
- **Panchayats may be entrusted with the responsibility under the Panchayat Act to protect the wetland so identified during the mapping exercise.**

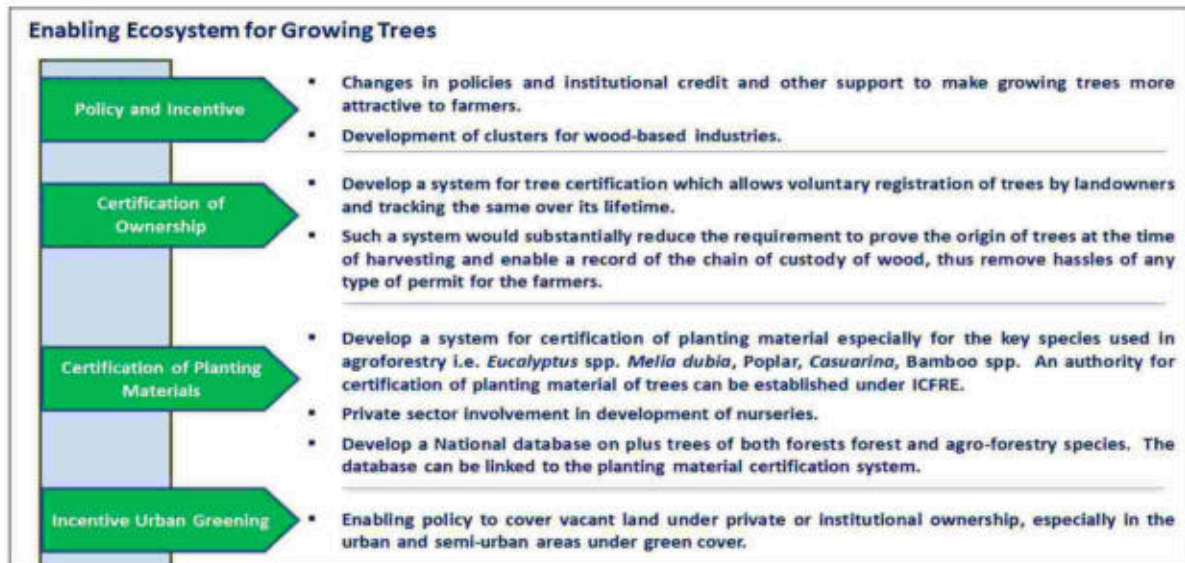
Action to be taken by the Ministry of Environment, Forest and Climate Change, the State Wetland Authorities and the State Irrigation Departments

12.1.7 Enabling Ecosystem for Growing Trees

Justification: Treating degraded and privately-owned marginal land outside forest areas present numerous challenges. For example, treating wastelands through agroforestry can motivate farmers if an arrangement for usufruct sharing is clear and they are able to realize economic benefits from the same. In many states, there continues to exist challenges for farmers to harvest trees and transport them to the nearby markets that act as a disincentive. Tree crops still compete with agricultural produce and their subsidy regime, they are often not the first choice of farmers even if they make better ecological and economic sense in the medium to long term.

While *laissez faire* regime for tree cutting may not be the right strategy given that there is a deficit of wood and wood products in general, simplification of harvesting and transit pass requirements is needed. A closer collaboration with wood-based industries is also required to open up the ecosystem and bring in private enterprise and innovation to harness the full potential of agroforestry.

The criticality of TOF in India's strategy for climate change mitigation requires a boost to agroforestry.



Action to be taken by the Ministry of Environment, Forest and Climate Change, the State Forest Departments and the Ministry of Housing and Urban Affairs

12.1.8 Diversion of Forest Land – Improving Monitoring and Assessing Impact Post Land Diversion

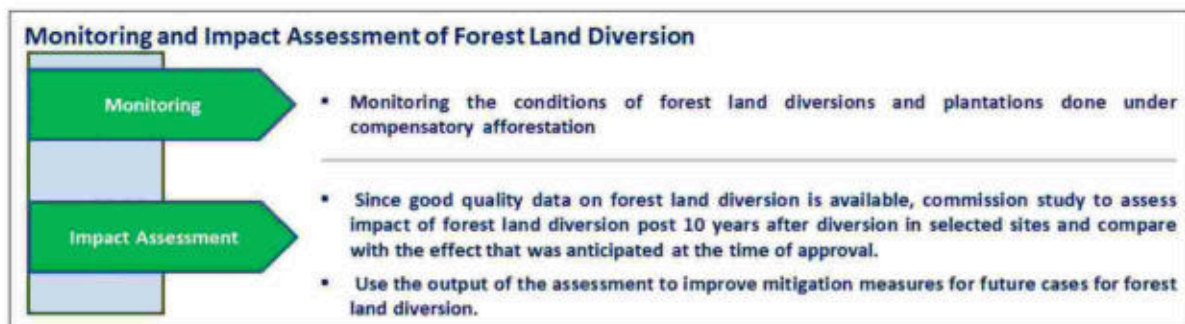
Justification: Forest land diversion for development purposes under the FCA 1980 is also a contributor to the reduction in forest cover. Since the enactment of the Act, 1.5 Mha of forest land has been diverted for non-forestry purposes.

Pricing of forest land is required to be backed by science to avoid moral hazard.

Data also suggests that land brought under compensatory afforestation has been less than the forest land diverted during 2008-2019, despite the legal requirement that an equal-sized tract of land is to be forested under the CA.

About 182,817 ha were provided for compensatory afforestation, which is equivalent to only 72% of the 253,179 ha of forest land diverted for non-forestry purposes between 2008 and 2019⁷³.

Since good quality data regarding forest land diversion is available for land diverted since 1980, the impact of diversion beyond the forest land diverted may be studied and learnings should be used in the revised design of compensation structure for land diversion as many of the unintended consequences, which may be difficult to avoid as it may not be priced in the compensatory value of forest land diverted.



Action to be taken by the Ministry of Environment, Forest and Climate Change

⁷³ E-Green Watch portal, August 20, 2020.




12.1.9 Strategy for Achieving LDN

A coordinated effort for achieving the target of restoring 26 Mha of degraded land by 2030 will require action on key fronts, which are recommended below.

12.1.9.1 Arriving at a Consensus Definition of Wasteland/Degraded Land

Justification: Multiple definitions of wasteland and degraded land and multiple agencies measuring the same have created an information system that is not useful for field level work.

Arriving at a Consensus Definition of Wasteland/ Degraded Land



- Develop and reach a consensus on the definition of wasteland/ degraded land.
- Develop database on degraded forest land based on previous forest cover assessment and ground truthing by involving State Forest Departments
- Assess status of land recorded as a wasteland in revenue records at the district level and estimate land available for restoration.
- Develop a portal to share the parcel wise details of degraded/ degrading land with further information which could be useful for its restoration
- Create sub classification of degraded land based on its potential for restoration so as to prioritize interventions and seek appropriate funds as well choose appropriate technology


Target Setting for LDN

Justification: As multiple agencies through their schemes/programmes are involved in efforts to tackle land degradation, the process of target setting and monitoring requires to be made more systematic for

better monitoring and impact assessment.

It is also critical to collate and disseminate knowledge and best practices on SLEM to a wider set of stakeholders, including people in public, for which a dedicated institution is necessary.


Target Setting for Land Degradation Neutrality (LDN)



- Identifying targets under individual schemes for LDN and cascade subordinate implementation levels.
- Identification of degraded land at parcel level from the existing data bases of SAC, NRSC, SLUSI, FSI and revenue department.
- Identification of areas which could then be allocated under various schemes for combination of schemes of the departments identified.
- Target to include land categories such as degraded forest land, culturable wasteland, degraded cultivable land, unused/ closed mines, grassland or common lands, land along national highways and railways, institutional land, vacant land in urban areas and large land allottees.

12.1.9.2 Framework to Monitor LDN

Framework to Monitor LDN

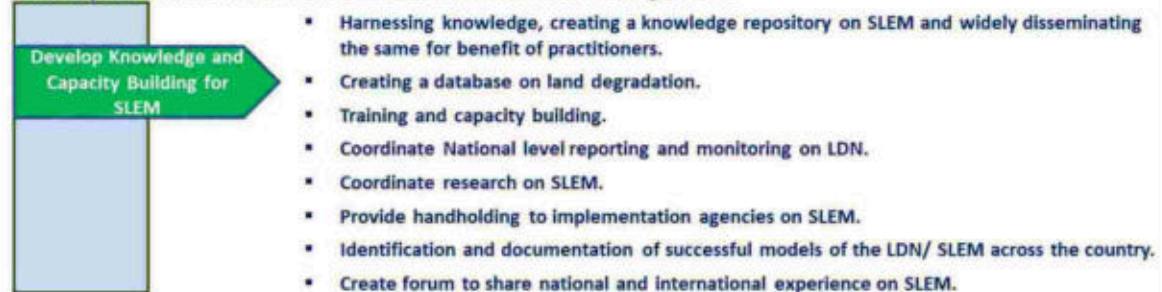


- Identification of primary stakeholders for reporting as the parameters that are to be monitored in PRAIS are being handled across various Ministries and Departments in Govt. of India and States.
- Orientation of the stakeholders on the reporting parameters and alignment of mutual understanding.
- Set definition of hotspots/ brightspots and undertake identification in the context of PRAIS based on the parameters: land cover, land productivity dynamics, soil organic carbon, both above ground and below ground carbon.
- Compilation of data related to restoration of degraded land by various Departments/ Agencies under different schemes and remove duplication.



12.1.9.3 Develop a Center of Excellence for Sustainable Land Management

Develop a Centre of Excellence on Sustainable Land Management



12.1.9.4 Develop a Specific Project on SLEM at the National Level

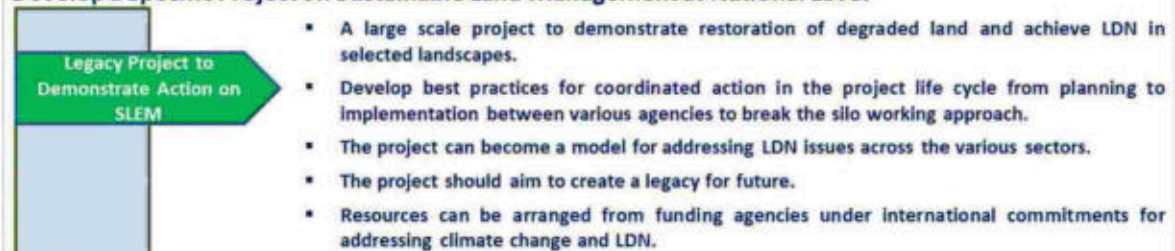
Justification: SLEM recognizes the interrelationships of land and other natural resources like vegetation, biodiversity and water. It also involves interventions in multiple land uses within a landscape or geographical unit. Naturally, a number of agencies will also be involved with multiple programmes and schemes, and therefore achieving the objectives of SLEM will need a more coordinated approach to planning and implementation, with specific institutional structures for collaborative actions of various stakeholders. A large project will serve as a model for

showcasing such an approach, deploying scientific knowledge, replicating best practices, highlighting successful use of technology, and building the capacity of institutions and implementers.

Such a large project will have multiple benefits in addition to treating degraded land within the project area.

Achieving Land Degradation Neutrality will require interventions on multiple fronts.

Develop a Specific Project on Sustainable Land Management at National Level



Action to be initiated by the Ministry of Environment, Forest and Climate Change

12.1.10 Contributing to LDN and NDC through the Greening of Highways

Justification: The road and highways sector also has an important stake in creating carbon sinks in the form of plantations along the highways. The country is witnessing massive road-building exercises with 4000

to 10000 Km of national highways constructed in the last six years⁷⁴ and about 10 million trees planted along the national highways. Where the right of way has been declared as Protected Forests, the plantation activities

⁷⁴ Year End Review 2019- Ministry of Road Transport & Highways (pib.gov.in)



are done by the state forest department, while in other cases, private contractors are involved. Discussions with stakeholders have revealed that the soundness and competency of agencies undertaking plantations have been a major challenge in achieving good results.

In addition, certain other constraints to greening highways can be listed as follows:

- (i) The main mandate of the road and highways sector being development of roads - greening along the highways has been a subsidiary activity.
- (ii) So far, the idea of having a dedicated strip of land in the road design for plantations has not been the norm, as this will probably involve additional

investment in land. Expansion of highways a few years later also affects the existing green belt.

- (iii) The other challenges of encroachment, damages due to anthropogenic reasons, insect and pest and difficult edaphic factors also affect the success of the plantation along the highways.

In addition to great driving experience, roads and highways present a unique opportunity for greening.

Improving the administration of greening activities under highways development programmes can be a huge contributor in India's attempt towards reaching LDN and NDC targets.

Contribution of Road Sector to LDN and NDC

Key Features

- Develop partnership with State Forest Departments in greening national highways as the SFDs have both reach and technical expertise to carry out the work.
- Plantation contractors should be facilitated to upgrade capacities so as to develop contractor based plantations market.
- Find solutions within the legal structure to restrictions on removing the plantations in case roadside amenities highway expansion is required.
- Develop green belt on unused part of ROW so that it does not interfere with highway operations.
- Find alternate methods to create plantations along highways through subsidizing or incentivising land owners on the boundary of the roads.
- Landowners may be compensated for each tree grown and protected as well as any income loss that is perceived due to diversion of land from agriculture to tree growing.
- As trees mature, landowner may be allowed to harvest and replant on the strip of land.
- For the purpose of monitoring and payment, a robust IT-based monitoring system along with DBT could be used for transferring compensation to the landowner.

Action to be taken by the Ministry of Environment, Forest and Climate Change, the National Highways Authority of India and the State Public Works Departments and Forest Departments

12.1.11 Focussed Attention on Rehabilitation of Mined-out Areas and Abandoned Mines

Justification: Mining activities result in the loss of forest cover and rich topsoil. They also lead to soil contamination, water pollution and biodiversity loss that cumulatively contributes to land degradation. The Mineral Policy 2019 provides a comprehensive framework for the rehabilitation of mining out areas. However, dedicated investments and monitoring are needed to supplement the policy framework for addressing issues of land degradation caused due to mining.

Development needs will continue to put pressure on land for extraction of minerals. Implementation of mine closure and rehabilitation will alleviate the pressure to a large extent.

The Environmental Management Plan (EMP) is mandatory as part of the environmental clearance for different industries. The objectives of the plan are to mitigate adverse impacts on identified environmental components, protect environmental resources and enhance the value of environmental components where

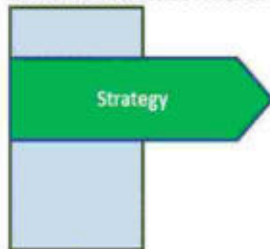


possible. The EMP also includes a monitoring plan to evaluate the success or failure of the environmental management measures and carry out reorientation of the plan if necessary. Monitoring of EMP has remained a weak area for the mining industry. Without periodic

regulatory oversight, there can be instances of violations or non-adherence to environmental standards.

Rehabilitation of illegal or abandoned mines is also a massive task not attempted due to the paucity of resources.

Rehabilitation of Mined Out Areas



- Monitoring of EMP of the mines, through the respective Ministries and third-party audit.
- Implementation and monitoring of the Sustainable Development Framework for the mining sector
- Implementation of a special programme on rehabilitation of mined-out areas and abandoned mines not covered under active EMPs.
- The programmes would entail interventions on forestry, reclamation of land for wildlife habitat, conservation of water, addressing livelihood of the local communities, etc.

Action to be taken by the Ministry of Environment, Forest and Climate Change in coordination with the Ministry of Coal, Ministry of Mines and Ministry of Steel

12.1.12 National Carbon Market

Justification: Pricing of carbon and ecosystem services could be a way to attract private funding. Providing funds for climate change mitigation and combating environmental degradation, especially in the Agriculture, Forestry and other Land Uses sector, has been a challenge despite global commitments. A thriving carbon market while being a source for additional funding also encourages companies and countries to reduce their CO₂ emissions. Carbon markets have played a significant role in India's climate policy since the Kyoto Protocol. Several environment-friendly projects have been registered under the Clean Development Mechanism under the UNFCCC, and some leading companies in India have invested in community-based carbon offset projects to achieve carbon neutrality. Many such companies have also pledged to be carbon neutral in the coming years. These projects have strong replication potential to bring about significant transformations in rural areas.

Pricing of carbon and ecosystem services could be a way to attract private funding.

India, as of today, does not have a national level market for carbon emission trading. However, internationally, the EU, New Zealand, Switzerland, Kazakhstan and the Republic of Korea have emission trading systems-based carbon markets at the national level. China has carbon markets operational at both sub-national and national levels.

A functional national carbon market will provide a platform for the involvement of private players and the community in the development of green areas, provide much-needed investment and spur the development of innovative projects for LDN, especially those that are required to be located on common land. A national level carbon market for allowing carbon emissions trading within India is required.

Action to be initiated by the Ministry of Environment, Forest and Climate Change in coordination with the Department of Industries and Ministry of Corporate Affairs



12.1.13 Enforcement of Sand Mining Guidelines, 2020

Justification: River sand beds hold water and sustain rivers, aquifers, land, soil and flora in the summer months. Rampant sand mining is a threat to river ecosystems, the hydrology of rivers, and connected aquifers. However, there is no effective regulatory mechanism for preventing the mining of sand from riverbeds and along riverbanks. The Sustainable Sand Mining Management Guidelines 2016 was published by the MoEFCC, supplemented by the Enforcement and

Monitoring Guidelines for Sand Mining, 2020. Despite several directions by the NGT and the issuing of guidelines, sand mining has remained unregulated.

Protecting river ecology would require stricter enforcement.

With a strict regulatory regime already in place, demand-supply mismatch and enforcement issues are more.

Enforcement of Sand Mining Guidelines

Improve Compliance

- States should be urged to adopt stricter rules in the light of guidelines issued by the MoEFCC and improve its implementation.

Action for the Ministry of Environment, Forest and Climate Change and States

12.1.14 Involving Students in Fighting Land Degradation

For involving the next generation of citizens, it is necessary to deepen the coverage along with case studies in the secondary school curriculum of global goals and international agreements on sustainable development as well as India's commitments on climate change and land degradation. It will make the future generation aware of the challenges in addressing the issues and instil in them a sense of commitment towards the issues of environment, SLEM and LDN.

Justification: There is already a tradition of engaging school-going children and college-going youth in tree plantation drives during the monsoon season as part of "Van Mahotsav" or during any special occasion. The recent

Leveraging the large population of students would have a multiplier effect in raising awareness.

trend of large-scale tree planting in many states has also become sort of a norm. Tree planting is also encouraged under the NCC and NSS programmes. These initiatives have immensely contributed towards enhancing the understanding of youth towards protecting the environment and has instilled a sense of ownership in improving the tree cover of the country. On similar lines, the proposal is to enhance the participation of youth in improving tree cover by introducing the concept of Graduation Legacy for improving tree cover⁷⁵.



⁷⁵ <https://mymodernmet.com/student-tree-planting-law-philippines/>



Involving Students in Increasing Tree Cover

Update Secondary School Curriculum

- Strengthen the topics related to national and international commitment to fight climate change and land degradation.

- Cover students appearing in the 12th Board examinations and students who are in the final year of graduation under any stream.
- Under the policy, such students should plant at least 5 trees each for getting their high school leaving certificate or their graduation diploma or degree certificate.

Introduction of a Graduation Legacy

- The trees can be planted in the two planting seasons before the award of the school certificate or anytime during the coursework of the graduation certificate.
- This programme can be initiated in Kendriya Vidyalayas, Sainik Schools, RIMC, Open University, Central Universities, IITs, IIMS, before upscaling at the National level to all schools and Universities.
- District administration would identify the piece of land where such tree planting would be done.
- The programmes can be integrated with the Van Mahotsava celebrations observed annually.
- Funding can be targeted by government as well through corporate contributions.

Action to be taken by the Ministry of Environment, Forest and Climate Change, the Ministry of Human Resources Development and the State Forest, Revenue and Education Departments, Urban and Rural local bodies and the school administration

12.1.15 Establishing a Mechanism for Measuring SDG Indicators Related to SLEM

Justification: National goals and targets under SDG-15 have to be cascaded to the state and district levels so that there is better appreciation by the field level units of the same. The idea of the targets feeding into the preparation of a baseline, annual plans and monitoring frameworks is important for achieving the national goals.

SDGs can be an effective tool to coordinate interventions in addition to BAU methods.

Comprehensive monitoring and reporting framework for collating achievements under identified indicators will be necessary for uniformity across the country.

Monitoring of Sustainable Development Goals (SDGs) Related to SLEM

Cascade Targets

- District-wise allocation of target against local benchmark, developing mapping and measurement infrastructures in place in districts.
- SDG Dashboard at the MoEFCC for monitoring achievement towards National goals.

Consolidating Action in the Context of SDG-15

- Mapping of water bodies, restoration and rejuvenation of water bodies, implementation of actions as per the Wetland Management Rules, involvement of people for sustainable management of waterbodies.
- Mapping and monitoring of degraded land, identification of hotspot, planning restoration works, desert proofing productive farmland through ecosystem-based approaches.
- Establishing a wildlife crime tracking system.
- Developing tools to test and identify wildlife products.
- Taking active measure to manage man-wild animal conflict, tracking and neutralizing organized illegal trade in wildlife.

Action to be taken by the Ministry of Environment, Forest and Climate Change



12.2 Interventions Overlapping with the Agriculture Sector

12.2.1 Policy on Development of Grasslands and Grazing Lands

Justification: Grasslands play an important role in the sustenance of rural communities as well as for free-ranging wild animals. Grassland ecosystems are found both inside and outside demarcated forest areas. Even within forests, grassland management has generally not been the prime focus, except when such grasslands form part of wildlife areas.

The grasslands outside forests are generally regarded as common lands and recorded under various categories unless privately owned. However, grasslands are not always recorded as "grassland" in revenue records. The records being ambiguous in this regard, distinction of grasslands on the basis of uncultivable wastelands, culturable wastelands, grasslands, rangelands, government lands and public lands is not easy to make out for boundary demarcation or delineation purposes. In many cases, the actual functional status of grasslands has also remained unrecorded due to competing claims between various departments. This has made the preparation of an inventory of grassland difficult.

Grasslands outside forest areas also have weak legal protection and are vulnerable to a variety of pressures leading to misuse or loss. The Supreme Court of India has issued detailed directions with respect to the removal of encroachments, protection and restoration on all village commons, including grasslands to their ecological state, along with the restoration of common rights of the dependent communities in the judgement of *Jagpal Singh & Ors Vs. State of Punjab and Ors (2011)*⁷⁶. However, the same remains to be implemented throughout the country.

Since independence, the major focus of land reforms has been the expansion of agriculture whereby more and more common lands either recorded as wastelands or unrecorded have been annexed to land redistribution programmes by the governments. The planning for the command area development has remained agriculture-centric, leaving out common and grazing lands, which support livestock rearing people.

The steady decline in customary grasslands has pushed pastoralists to other regions resulting in pressure on the forest and degradation of common land. This has also exacerbated the fodder availability for traditional pastoralists who migrate over large distances in search of fodder for their livestock.

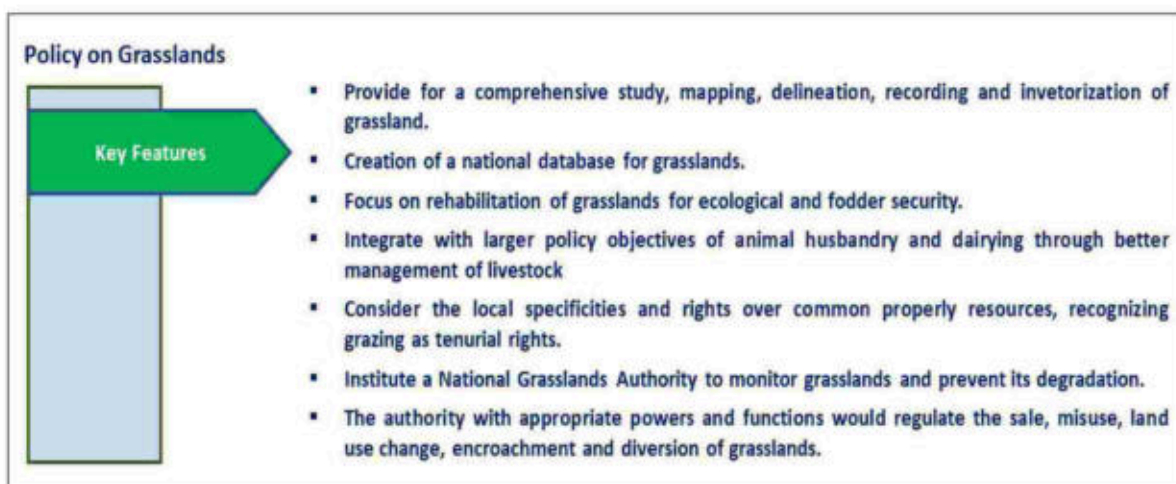
There is also the absence of detailed assessment of the biodiversity values and ecosystem services that the grasslands provide in the Indian context, including their role in improving carbon stock.

The Animal Husbandry departments deal with ensuring livestock health and productivity but not the grass on which livestock survives. Under the National Livestock Mission, only 2.3% of the total spending is allocated for fodder management.

The complex landscape of grassland management necessitates a policy on grassland for a concerted action to protect this resource by all the concerned wings of the government.

Grasslands are not only important from ecological perspective but also form one of the key pillars to support livelihoods. However, they are not covered under any structured policy instrument.

⁷⁶ CIVIL APPEAL NO.1132 /2011 arising out of SLP(C) No.3109/2011; Para 22: Before parting with this case we give directions to all the State governments in the country that they should prepare schemes for eviction of illegal/unauthorized occupants of Gram Sabha/Gram Panchayat/Poramboke/Shamlat land and these must be restored to the Gram Sabha/Gram Panchayat for the common use of villagers of the village.



Action to be taken by the Ministry of Agriculture and Farmers Welfare in consultation with the MoEFCC and the Department of Animal Husbandry and Dairying

12.2.2 Special Scheme for Development of Grasslands and Grazing Lands

Justification: Unrestrained and overgrazing is one of the chief drivers of grassland degradation. There is no department which is explicitly targeting the development of grazing land in the country. Common lands in villages are under tremendous pressure of land diversion and encroachment. The Forest Department in some states does support the development of grassland, but the scale is very limited. Rotational grazing has not been successful as a policy as the pressure on forests due to the large cattle population, especially in forest fringes, remains high.

The National Livestock Mission has been supporting the improvement of quality of livestock, production and storage of fodder and improvement of nutrition in livestock feed. It is important to converge the programme in a focussed manner in the forest fringe villages.

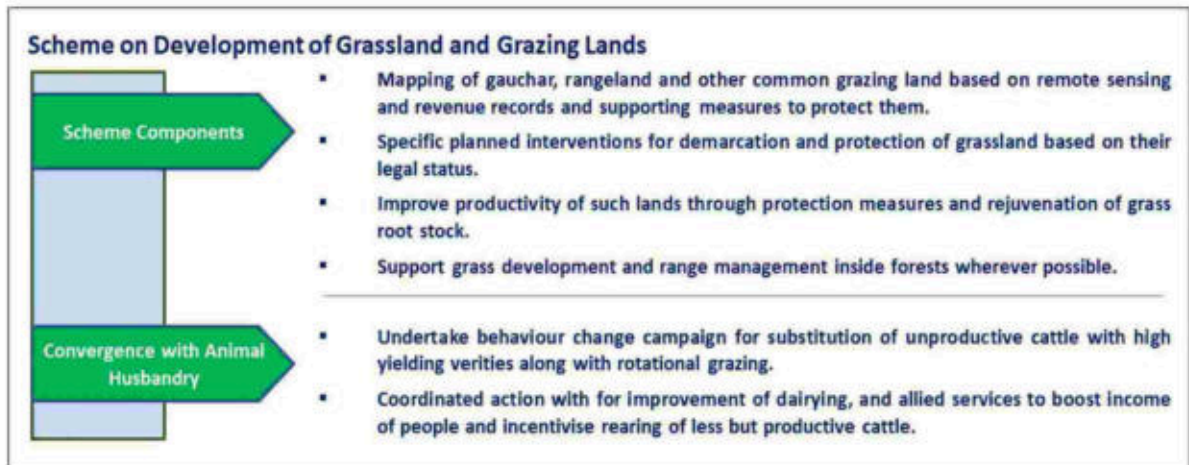
While scores of forestry programmes, especially in the hill states of India, have been introduced with the aim to protect forests from free grazing, no fodder value grass was ever introduced that will mitigate the impacts of free grazing in forests. On the contrary, many of the forest areas on the fringes of villages are covered with invasive species producing even less grass and fodder.

The development of fodder was a component of the RKVY but has had limited success. The Accelerated Fodder Development Programme was implemented under the RKVY in eight states from 2011-12 to 2013-14. In 2011-12 and 2012-13, about 13.7 lakh ha was covered with an expenditure of Rs 428 crore.

Thus, the core issue of the non-availability of fodder and its cascading impact on forests has always remained alive.

Grasslands and grazing land development have generally remained incidental to other development programmes.

It is recommended that a special scheme for the development of grazing and grassland may be taken up. Apart from the development of traditional grasslands, sites that are primarily used for tree plantations can also be used to develop grasses to meet the fodder requirements of local people. Land restored from landfills, mines, wastelands, and degraded lands can serve the twin objective of land restoration and fodder development. Similarly, conflict zones around buffer areas can be developed to grow fodder to meet the fodder needs of the dependent communities, thus addressing the degradation of forest lands.



Action to be taken by the Ministry of Agriculture and Farmers Welfare, the Ministry of Environment, Forest and Climate Change and the Department of Animal Husbandry.

12.2.3 Disincentivizing Overuse of Water for Agriculture

Justification: The linkages between inadequate irrigation facilities and groundwater use for irrigation are ignored under the NWP, 2012. From a country with the largest network of dams and irrigation canals in 1947 to the largest groundwater economy in the world (4th Minor Irrigation Census 2006-07 base year), the water used for irrigation itself has undergone a major change but requires a paradigm shift in the way the water and irrigation policies and laws at the state level have dealt with irrigation.

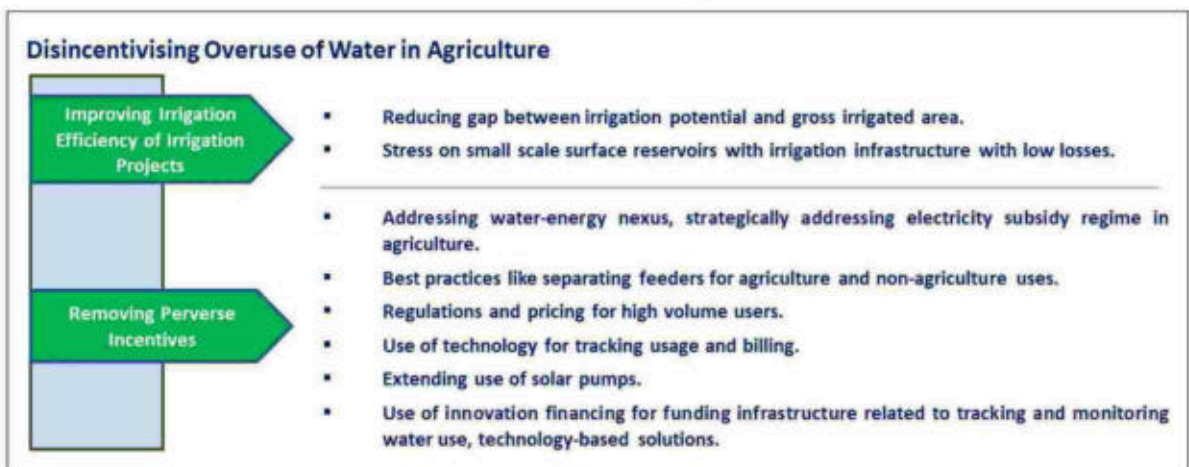
The NWP is also silent on the performance of large dams and the need for small reservoirs to extend irrigation facilities. Thus, national and state-level water policies need to identify measures that will optimize the existing irrigation

facilities, including building small reservoirs locally and reducing water transportation and distribution losses through long-distance canals and distribution networks.

The groundwater-energy nexus has created perverse incentives, which has been the major driver of agricultural land degradation.

The problems due to overuse of water are well known, but the journey towards the solution needs to start at the earliest.

There is, therefore, an urgent need to move towards disincentivizing the overuse of water in agriculture, which is not only threatening water availability but also is a cause of land degradation.



Action to be taken by the Ministry of Power, the Ministry of Jal Shakti and the Ministry of Agriculture and Farmers Welfare



12.2.4 National Portal for Agroforestry

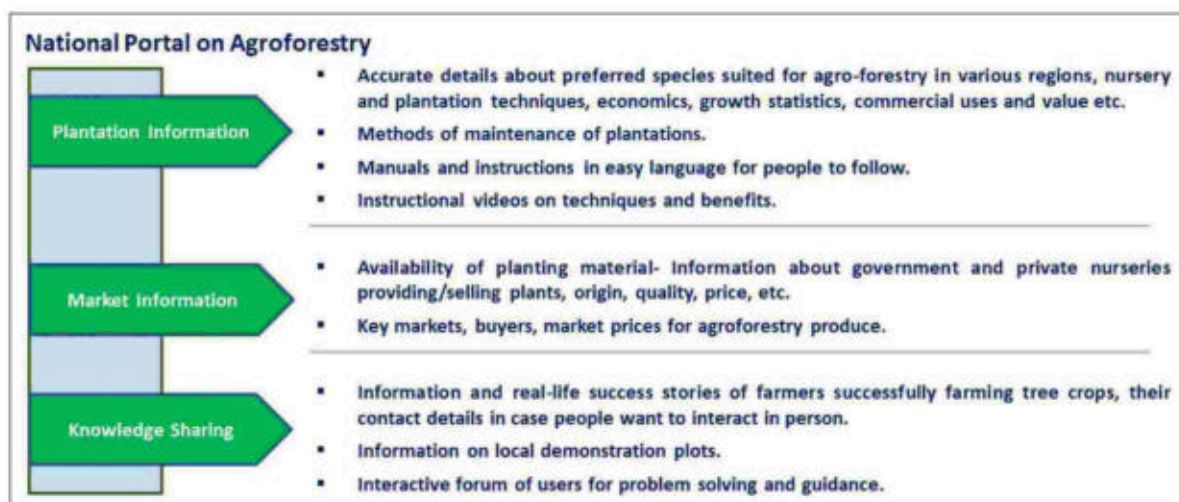
Justification: Promoting agroforestry requires the development of the entire ecosystem related to the supply and demand of wood. One of the key prerequisites is easy access to authentic data on tree crops for the general public interested in growing trees for commercial objectives or otherwise. Though information on trees, viz. its characteristics, suitability as per site conditions, details of how and when to get seeds, nursery techniques, growth characteristics, silviculture practices, diseases and cure, growth statistics, economics, input cost, plantation models, research-based techniques that can be taken to the field and training manuals are available through many sources, they are widely spread and unverified. It is a difficult task for a common person to locate authenticated and useful information when required. Another critical

information gap is regarding the verified sources from where quality planting material can be procured in bulk.

A one-stop portal can solve many of these challenges related to the information gap. The portal will have to be kept updated for which private players can be brought on the portal, creating business opportunities for them as well.

Overcoming barriers to adoption of agroforestry requires breaking the information asymmetry.

The portal can be expanded in reach and content with time with the addition and networking of a larger number of organizations and users. The portal, in due course, will also become a useful repository of data, that can be used in planning and agroforestry extension activities.



Action to be taken by the Ministry of Agriculture and Farmers Welfare, Ministry of Environment, Forest and Climate Change and the State Forest Departments

12.2.5 Incentives for Investment in Land Protection

Justification: High-intensity agriculture being practised due to overuse of inputs and unsustainable farming techniques are the main causes of agriculture land degradation. While soil health has been given attention, addressing land degradation or restoration of degraded land in private ownership in a holistic way is missing in

current programmes and policies of the Centre or the states. Most of the farmers in India are small and marginal farmers who do not have enough capital to invest in their farms. Changes in policies and programmes need to be made to encourage investment by small and marginal farmers.



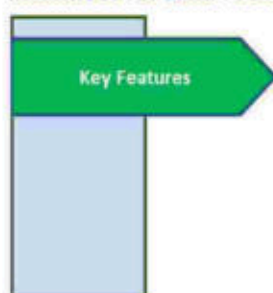
Wider extension of techniques and tools are also missing, which causes a hindrance in propagating sound agricultural practices to reduce or cease land degradation of agricultural lands.

So far, reclamation of problem lands such as waterlogged, sodic and acidic soils has been initiated through state funding. Subsidies are also being given for the installation

of micro-irrigation for better resource efficiency, which also helps protect the land from waterlogging or intensive use of fertilizers. To increase the participation of farmers and landowners in taking up land protection measures, facilitation in the form of a specific programme is required.

Overcoming the individual's resistance to invest in land protection needs a nudge.

Incentives for Land Protection



- **Develop a programme where land owners can seek funding and technical support for land protection.**
- **Beneficiaries can apply for support as grant or bank loans.**
- **Projects can be prepared on the request of the beneficiary based on scientific principles.**
- **A cadre of local technical personnel could help the farmers for the same.**
- **The activities under the project can be funded using existing schemes or MGGREGS.**
- **Based on feasibility, some of the projects can be converted into bankable project and funded through credit.**
- **Interest subsidy can also be provided for taking up such works.**

Action to be taken by the Ministry of Agriculture and Farmers Welfare and the Ministry of Rural Development, Department of Land Resources.

12.2.6 Subsidy Specific Study on Agriculture

Justification: The agriculture sector is provided with many direct and indirect subsidies in the form of power and input subsidies, loan waivers and agriculture equipment subsidies. For example, the fertilizer subsidy for 2020-21 is estimated to be Rs 1,33,947 crore. The total power and water subsidy given away by states can amount to Rs 2,00,000 crores⁷⁷. Each subsidy is being provided with the larger goal of supporting small and marginal farmers in lowering their production costs and improving their income. While subsidies are important given the strategic nature of the sector and the high dependence of people on livelihoods and food security, subsidies distort markets and people's behaviour, thus diverting the outcomes from the intended goals. The subsidy induced behaviour has a grave impact on the sustainability and conservation of natural resources as the value of these resources are not adequately priced in the cost of products or subsidies. It is now becoming imperative to consider environmental factors, especially the sustainability of land and water, in deciding the subsidies.

Further, input and output subsidies affect the entire agriculture value chain as they are connected in a complex

web with production, farmers' income, the business of related industries, and price to consumers. Most of these subsidies are well ingrained in the agricultural economy, and changing any one of them will have a cascading effect on the entire value chain, evoking drastic and severe reactions from the socio-political ecosystem.

A sudden change in the subsidy regime being counterproductive to the long-term goal, it is important to bring out high-quality studies on the effect of subsidies on the entire value chain and educate people and communities about difficult choices that are there to be made now vs in the future. There have been various studies on the economics of subsidies in general. However, a study and the modelling of the impact on land degradation have not been undertaken so far. Such a series of studies is being proposed.

Subsidies have distorted the agriculture landscape and are required to be studied to aid far more informed discourse, as removing them outrightly may not be immediately feasible.

⁷⁷ <https://www.sundayguardianlive.com/news/dbt-2-0-model-poverty-free-india>



Study on Impact of Subsidies on Land Degradation

Impact Studies

- Study of cause and effect of subsidies on land degradation, agriculture biodiversity and sustainability of water and soil fertility.
- Study of effects on cropping patterns, total output and incomes if certain subsidies are optimized to achieve long term environment security goals.
- Study may also discount the requirement of funds in the future to address the ill impacts of land degradation due to subsidies at present.
- Assess and develop pathway to optimize economic welfare, food security and land degradation.
- Develop data and knowledge for enabling larger public discourse on subsidies.

Action to be taken by the Ministry of Agriculture and Farmers Welfare

12.3

Interventions Related to the Water Sector

12.3.1 Linking National Water Policy to Land and Forest

Justification: The NWP 2012 states the key challenges in the management of water resources, but most of the recommendations are yet to be taken up for implementation. The policy treats water as a hydro-geological and techno-economic entity for managing the demand and supply balance, but the supply side management of water is not covered with the same intensity. The quality and quantum of both surface and groundwater largely depend on land and forests, but the role of land and forest in creating water availability as an ecosystem service is also not adequately emphasized.

The NWP 2012 as the key instrument on water inter alia also seeks to promote Integrated Water Resources Management (IWRM) but does not prescribe the institution for water governance or guidance at a

decentralized level to ensure its operationalization. The IWRM at the river basin level will require specific agencies to be created and capacitated by the state. It will also provide the platform for sustainable management of land to maintain the supply of water,

Focus on land and forests under the NWP in the context of management of water resources will give a boost to the sustainable management of land and forests by formally connecting it with the supply of a tangible resource, such as water, and will also in due course lay the foundation for payment of ecosystem services.

Availability of water depends totally on how land on which it falls is managed. Integration of the policies on land, water and forests will enable coordinated action by various agencies.

Linking National Water Policy with Land and Forests

Aspects to be taken care of in National Water Policy

- Establishing clear links of water with land and forest and suggesting contingent measures for land management and protection of forests as watersheds.
- Emphasis on identifying and maintaining the role of forests for water at basin level.
- Specific action points related to both land and water to improve seasonal availability.
- A national level institution needs to anchor the operationalization of IWRM wherein the States are guided with a wide range of interventions to be made by both, governments and citizens aimed at sustainable availability of water and reducing water footprint.

Action to be taken by the Ministry of Jal Shakti in coordination with the Ministry of Environment, Forest and Climate Change and the State Water Resources Departments.



12.3.2 Legislation on Ecological Flows in Rivers

Justification: The statutory framework applicable to rivers consisting of the Water Act, the Environment Protection Act and the NWP 2012 do not make a minimum amount of flows needed by a river to survive and flow; only protection of rivers and streams from pollution is provided for. In its report released in 2018, the Central Pollution Control Board noted that nearly 351 river stretches in the country are severely polluted and are choked due to various reasons, including diminished and negligible environmental flows in the lean season.

The NWP 2012 does state that the ecological needs of the river should be determined through scientific study and should accommodate developmental needs. A portion of river flows should be kept aside to meet the needs ensuring that the low and high flow releases are proportional to the natural flow regime, including the base flow contribution in the low flow season through regulated ground water use.

While interventions in watersheds/catchments/floodplains support the increase in the water retention capacity of rivers, ensuring the allocation of stipulated discharges to make the flows available in rivers is a strategy that should be pursued.

The National Green Tribunal, Principal Bench, had also taken cognizance of the report in the OA No.673/2018. The NGT has issued extensive directions to the state

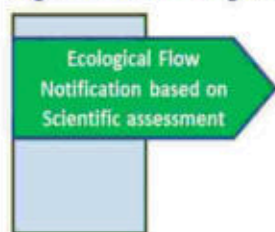
governments to constitute River Rejuvenation Committees (RRCs) to function under the overall supervision of the Principal Secretary, Environment, and in coordination with the state departments will formulate the Action Plans to ensure river health. One of the key components of the Action Plan should be to ensure Environmental Flow. In addition to e-flows, the Action Plan will also provide for the plantations on both sides of the rivers.

There are certain grey areas as far as the quantum and basis of consensus on e-flows are concerned, leaving matters to interpretation on a case to case basis. For example, a minimum of 20% of the flow to be maintained as e-flow in a verdict given by the NGT has not been made applicable in all circumstances. Similarly, there is no scientifically accepted and legally vetted definition of e-flows. All dam authorities are not mandated by the law to ensure minimal e-flow in the river. The long-term trade-offs of not releasing such flows are also not properly understood by the river valley authorities.

A legislation on mandatory e-flows in all rivers where water is impounded or water is extracted is being recommended.

Preventing death of rivers due to no or negligible flow would require legislative intervention.

Legislation on Ecological Flows in Rivers



- A Basin-wise scientific assessment of e-flows is required to be carried out given that the river systems in the country are very dynamic and diverse and e-flow requirements will be different for each river.
- A policy direction on ecological flows will be ineffective as water is a State subject and States tend to take time to adapt to National Policies.
- Based on the assessment, there should be a notification issued aided by a specific legislation wherein maintaining specific basin-wide ecological flows is made mandatory.

Action to be taken by the Ministry of Jal Shakti and Ministry of Environment, Forest and Climate Change and implemented by the states

12.3.3 Participatory and Decentralized Groundwater Management

Justification: In India, rights on groundwater belong to the landowner since it forms part of the dominant heritage. Land ownership is governed by the Indian Property Act,

1882, and the tenancy laws of a state. The Transfer of Property Act necessitates that the right to groundwater can be given to anyone only if the land is transferred. The law of

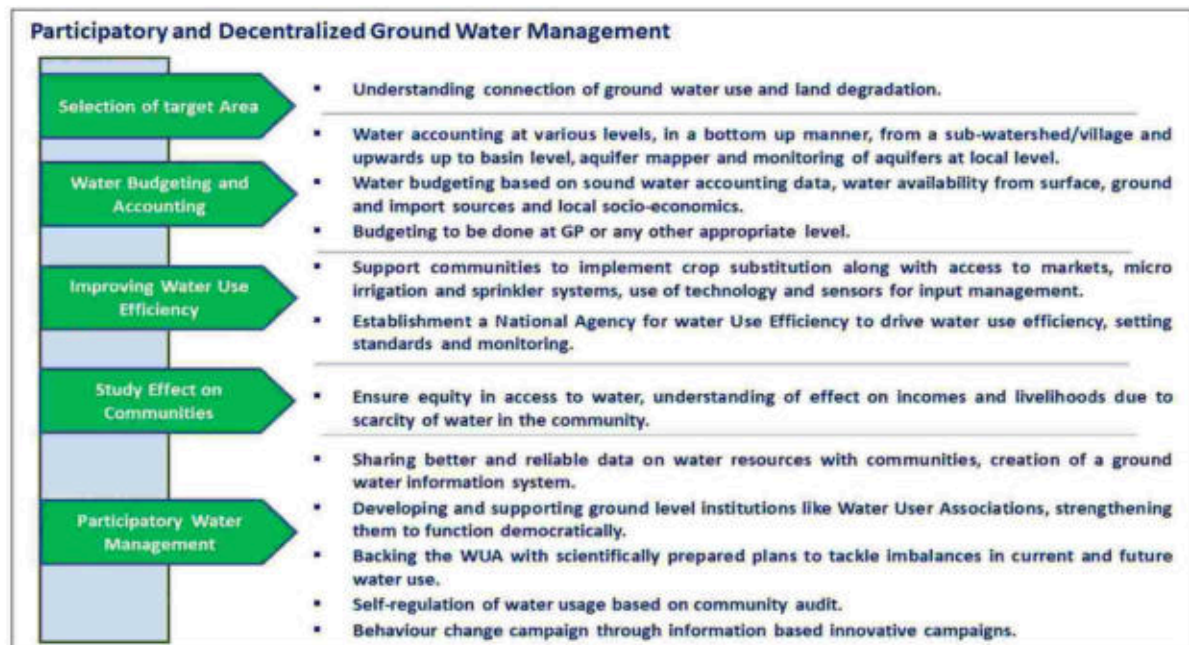


land acquisition provides that if one is interested in the easement (groundwater), he will have to be interested in the land. The Indian Easement Act, 1882, also protects a landowner's right to groundwater as his right to an easement. Thus, groundwater is as a chattel attached to the land, and there is no limitation under the central legislations that allows how much groundwater can be enjoyed by the landowners.

In other words, only landowner's own groundwater in India. Thus, all the landless peasants, tribals who have natural or customary community rights over land but not private

rights, do not have the right to groundwater. This also means that landlords in India are water lords having de-facto and de-jure rights to control groundwater abstraction and use. This is in contravention to the Doctrine of Public Trust under the NWP 2012, which is also recognized as the environmental law principles established by the Supreme Court of India in a number of landmark cases concerning sustainable development in India.

Changing the pattern of use of ground water would require significant behaviour changes in addition to reorganising economic activities.



Action to be initiated by the Ministry of Jal Shakti, Ground Water Board and Central Ground Water Authority

Regulating ground water use has been a challenging problem. As per global examples, normatively sustainable use of water has been tried through regulations on water extraction, market-based approach or self-regulation. The onus, however, does fall on the capacity of the state to enforce agreements in such approaches.

Participation and decentralization of ground water management appear to be a possible solution, which needs to be upscaled in the water stress areas of the country. Thus, the approach is recommended as an option for achieving sustainability of ground water resources.





12.4 Institutional Mechanisms and Decentralized Governance to Support SLEM

12.4.1 Common Planning Tool for MGNREGA and Watershed Projects

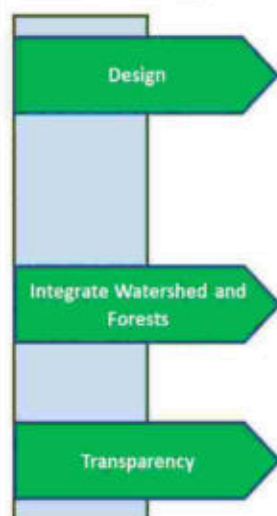
Justification: MGNREGS is a flagship programme of the government to provide employment in rural areas. While the scheme's main aim is employment-oriented, asset creation for NRM and water conservation has been one of the focus areas during implementation. Committed funding is also a positive aspect of the scheme.

Even though more than 50% of the funds are spent on NRM works, the expenditure is mostly incidental due to the demand-driven nature of the scheme. The scheme guidelines do prescribe ridge to valley approach in the planning of NRM works. However, due to the programme's

design and coordination constraints at the ground level, this has been challenging. If taken up on a scientific basis, the NRM related works have a huge potential to address land degradation and create climate-resilient infrastructure. Closer integration of watershed and MGNREGS is required for achieving optimality in this aspect.

Funds under MGNREGA are being tapped by various departments, but an institution for common planning of land related works would enhance outcomes.

Common Planning Tool for MGNREGS



- The planning tool would allow integrated planning at the village level, blending the net planning process of watershed programme with MGNREGS.
 - Areas in villages can be identified and prioritized for treatments through a participatory process and a list of possible works can be prepared at least one season in advance.
 - The same can be widely shared with the beneficiaries to enable better manpower deployment.
-
- The Forest department should also use the tool to plan its interventions in the watersheds falling within forests while dovetailing it with their requirements under Working Plans.
 - Alignment of forestry works should be done as per the National Working Plan Code 2014.
 - The technical team under watershed can provide the technical support for preparing the NRM plan under MGNREGA, Alternatively, the MGNREGS team at the ground level may be strengthened with a soil and moisture conservation expert.
-
- For transparency purpose, a map of the area with planned works to be taken up as well as the employment calendar can be placed in a central place in the village to remove information asymmetry.

Action to be taken by the Ministry of Rural Development in coordination with the Ministry of Environment, Forest and Climate Change and the Department of Land Resources

MGNREGS follows an annual cycle of planning and implementation, which in practice, is not an ideal cycle for the NRM-based approach. The watershed programmes follow their own planning, funding and implementation cycle. Land conservation activities are also implemented

by the forest and agriculture departments, following their own process for planning and implementation.

A common planning tool for MGNREGS, Watershed and other departments will be an asset for integrated planning of NRM works.



12.4.2 Special Provision in MGNREGA for Tribal and Forest Fringe Village Areas

Justification: Scheduled Tribes (STs) constitute 8.6% of the total population in the country. However, 47.1% of all STs are below the poverty line in rural areas compared to 33.8% of the national average. STs also constitute 40% of the people displaced since independence due to the construction of dams, mines, industrial development and creation of wildlife parks and sanctuaries. Incidences of landlessness are also higher in STs compared to the national average¹⁸.

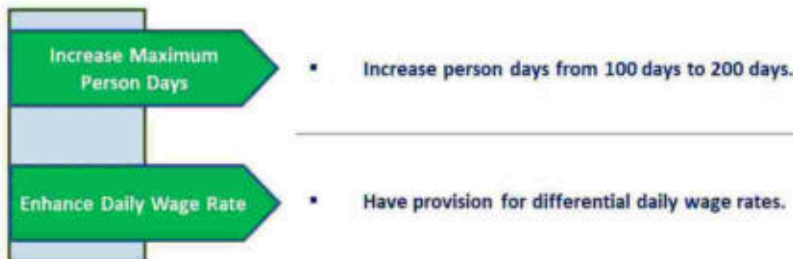
On the other hand, the scheduled areas are also home to rich biodiversity, dense forests, and mineral wealth. The dependence of tribal people on forests continues due to poverty, subsistence agriculture, migration, debt trap, customary dependence on cattle

for livelihood security, and survival on “free” fuel and timber. As a result, forest ecosystems are being subjected to extractions of resources far higher than the rejuvenation capacity. Providing livelihood security has the potential of substantially reducing the pressure, mainly due to deprivation.

It is recommended to allow up to 200 person-days of employment per household instead of 100 days in tribal and forest fringe areas. In addition, flexibility to increase daily wage rates in such areas may also be allowed.

Tribal areas require more livelihood support to relieve natural resources from sustenance related exploitation.

Special Provision for MGNREGA in Tribal and FFV Areas



Action to taken by the Ministry of Rural Development

12.4.3 Revival of Land Use Boards

Justification: While considerable attention has been paid to land reforms throughout formal planning processes in India, institutional response to sustainable land use, management and governance has been rather absent. As a result, there has been large-scale use of land acquisition laws and ceiling laws to acquire more land while the planned and management of land use has lagged.

State Land Use Boards (SLUBs) set up by 1974 in most of the states and UTs, which had been restructured in 1985 as the apex body on land use at the State level under a Centrally-Sponsored Program, had the key mandate to provide policy direction for sustainable development of

land resources, ensure inter-departmental coordination and initiate integrated planning. The states were also required to implement the 19-point agenda (as part of the National Land Use Policy Outline). The states and UTs have also not been forthcoming in the preparation of perspective plans and formulation of development schemes as per the suggestions in the perspective plan.

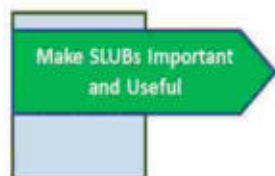
SLUBs can bridge the institutional gap of the absence of a single agency catering to land management in the states.

A nodal agency to address and manage land use related issues is missing today.

¹⁸ <https://www.cprindia.org/projects/land-rights-scheduled-areas> - 9.4% of the STs are landless compared to 7.4% for the National average



Revival of State Land Use Boards (SLUBs)



- Make SLUBs as Statutory Body under law to give them teeth. SLUBs created through an administrative process has made them lack effectiveness.
- Empower the SLUBs with financial resources and regulatory functions apart from being advisory and representative in nature.
- Inter-departmental coordination mandate is essential to empower SLUBs as apex policy, planning and implementing agencies.

Action to be initiated by the Department of Land Resources in coordination with the Ministry of Environment Forest and Climate Change and the Ministry of Tribal Affairs

12.4.4 Integrating SLEM with Panchayat Development Plans

Justification: Comprehensive micro-planning at the gram panchayat level provides an institutional process to combine the developmental needs of the panchayat with the financial, human and ecological resources available. Planning for SLEM should get integrated with local development at the very early stages of planning. Of the 29 functions devolved to the panchayats, the ones that directly relate to SLEM are - Agriculture; land improvement, implementation of land reforms, land consolidation and soil conservation; minor irrigation, water management and watershed development; social forestry and farm forestry; minor forest produce and fuel and fodder. In the absence of microplanning, the panchayats have been implementing sectoral projects and programmes as isolated interventions.

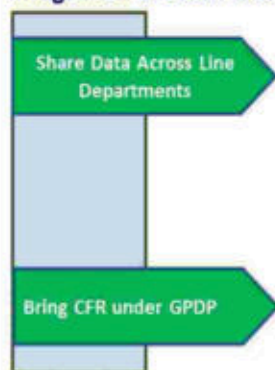
The Gram Panchayat Development Plan (GPDP) was

initiated in 2018 through the People Plan Campaign. The GPDP is a comprehensive plan with two components – a five-year perspective plan and an annual activity/operational plan. It is based on participatory processes and special gram sabhas held for the purpose of planning.

The planning process has also been extended to Block and District Panchayats, wherein the subject of SLEM should figure at a priority. The integration of SLEM with the planning process at the grassroots level, i.e. in GPDP, Block and District plans, will bring the focus of communities on sustainability and access to land and water resources.

Planning for SLEM should get integrated with local development at the very early stages of planning.

Integration of SLEM with Gram Panchayat Development Plan (GPDP)



- Data from MGNREGA, Forest, Agriculture, Soil Conservation, Watersheds and Bhumi Sudhar should be fed into the process of planning for GPDP.
 - Coordination would be required among the line departments prior to the GPDP process to enable sharing of updated data.
 - The visioning exercise should be facilitated to include SLEM as a thematic area for development.
 - Prioritization of activities and convergence plan should be a part of the Development Status Report.
-
- GPDP should include a sustainable forest land-use plan for the forest land recognized under the community forest resources in consultation and guidance of local Forest Department.

Action to be taken by the Ministry of Panchayati Raj in coordination with the Ministry of Rural Development, the Ministry of Agriculture and Farmers Welfare, and the Ministry of Environment Forest and Climate Change



12.4.5 Standing Committee on Land Management in Panchayats

Justification: The constitution of standing committees for all three tiers of PRIs is mandated in the states' PRI Acts. The standing committee comprises members of panchayat and others, who are interested in public welfare and are nominated by the panchayat. The committees take charge of subjects devolved to PRIs, such as agriculture, sanitation, communication, public health and education.

A standing committee on environment/forests/land conservation has not been the norm at the Gram Panchayat level across the country, though such committees are there in some states. The committee's role

will be important for the sustainable management of land resources in areas of the GP and for acknowledging and coordinating efforts to address the critical issues of land erosion, waterlogging, salinity or desertification.

Besides, a committee to deal with the subject at the GP level will bring sustainability into discourse and a factor in decision making, especially on issues related to land.

Large variations are found in the institutions within panchayat in the country to deal with sustainable land management and environment protection.

Standing Committee on Land and Forests in Panchayat



- State Governments may be advised to incorporate the provision of constituting a Standing Committee on land management in the PGs within their State.
- The Standing Committee should have clearly demarcated responsibilities for land allotment, land conservation, addressing soil erosion and desertification, soil and moisture conservation and other problem lands, protection of common land, checking encroachment in common land, forest land and village water bodies, etc.
- The Committee can also function to coordinate with JFMCs, EDCs and Watershed Management Committees at the village level.

Action to be taken by the Ministry of Panchayati Raj in consultation with the Ministry of Environment Forest and Climate Change and the state governments

12.5 Addressing Social Aspects for SLEM

12.5.1 Strengthening Community Participation in SLEM Programmes

Justification: Community participation is the pathway to get people involved in managing the local ecological resources because alienating people dependent on the resources that constitute their livelihoods leads to conflict and resource degradation. Village institutions, both statutory local governance institutions of panchayat and Gram Sabha and

sectoral committees created under various programmes, are the primary vehicles through which community participation is sought and implemented.

People are an important component of SLEM and there should be equal amount of investment in addition to scientific inputs.



Action to be taken jointly by the Ministry of Environment, Forest and Climate Change, Ministry of Rural Development, Ministry of Agriculture and Farmers Welfare, Ministry of Panchayati Raj, and Ministry of Tribal Affairs

Various studies on improving the effectiveness of community participation in managing natural resources have identified areas that require improvement:

- Streamlining participatory planning across programmes
- Generating information and awareness about the policies and programmes among the members of panchayat, Gram Sabha and sectoral committees
- Sensitizing and imparting training to the project implementation staff at the middle and micro-levels

(iv) Maintaining transparency in fund management at the micro-level

(v) Monitoring the programme implementation and accountability

Hence, strengthening the community participation aspect in SLEM programmes through systematic interventions is proposed.

12.5.2 Gender Mainstreaming in SLEM Policies and Programmes

Justification: Women are primary stakeholders in ensuring the sustainability of ecological resources like land, water and forest. In rural areas, women are both the users as well as the managers of the resources.

Gender mainstreaming requires that gender aspects are paid attention to throughout the cycle of a policy/programme - conceptualization, formulation of policies, implementation of programmes reporting the outcomes, and monitoring them. While the current

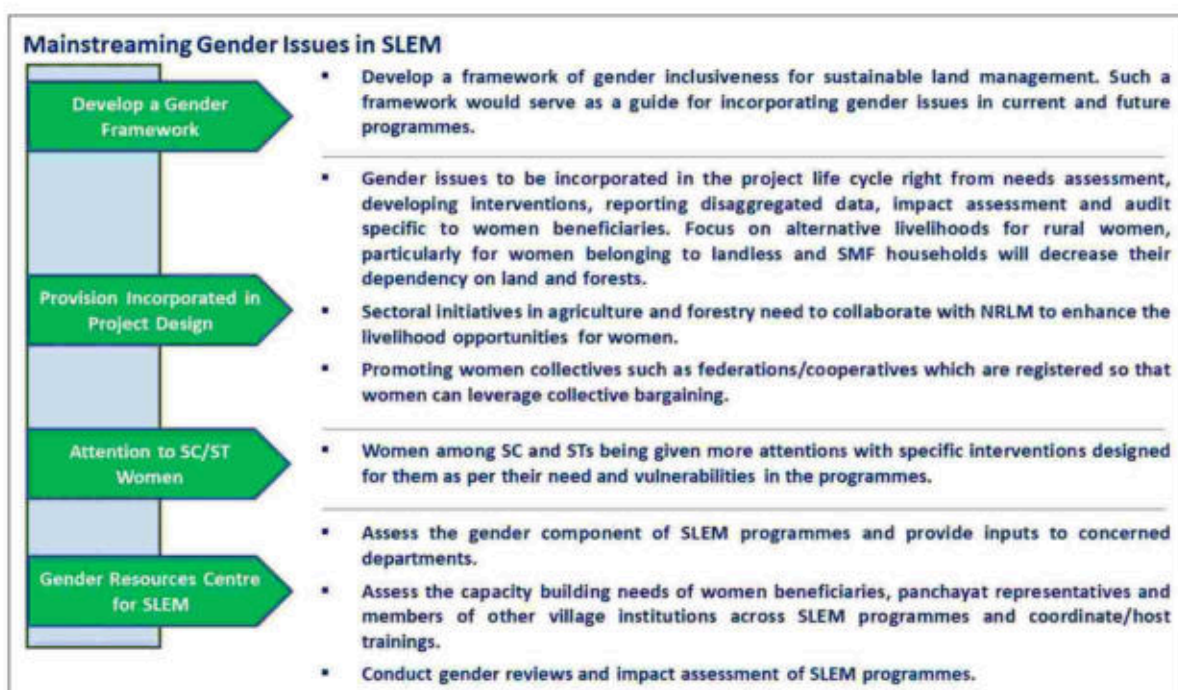
policies and programmes have incorporated gender issues, there are still gaps and challenges:

- Absence of a comprehensive gender framework or approach that can inform/guide SLEM
- Sector-specific gender issues, concerns and the ways to address them are not adequately articulated in SLEM policies
- Absence of systematic mapping of the needs of more vulnerable sections of rural women



- (iv) While women's involvement in decision-making is streamlined by providing them with membership in panchayat and sectoral committees of programmes, the barriers to women's participation is still a challenge
- (v) Gender-inclusive planning, budgeting, reporting and monitoring across programmes is not streamlined
- (vi) Absence of a systematic way to assess the capacity building needs and provision of training to make them aware and informed as well as build skills to play their role in sustainable management of land water and forests.

Gender neutrality at times also is gender discriminatory. Women have a large role in managing land and forests, which needs recognition in policies and programmes.



Action to be initiated by the Ministry of Environment, Forest and Climate Change in consultation with the Ministry of Agriculture and Farmers Welfare, the Ministry of Rural Development, the Ministry of Panchayati Raj and the Ministry of Women and Child Development

12.5.3 Addressing Needs of Women Farmers in Implementation of SLEM

Justification: Women farmers cultivate land as owner-cultivators, tenants and sharecroppers and wage labourers. The Agricultural Census 2015-2016 shows that women's operational landholding has increased in number over the previous census period. The National Policy for Farmers 2007 and the National Agriculture Policy 2000 have included women farmers as an important stakeholder in agriculture. There are, however, critical challenges that women farmers face:

- (i) A majority of women cultivate the land without legal

ownership in the absence of which not only women farmers are deprived of availing of institutional credit and other facilities, such as access to regularized market for the sale of their produce; it also acts as a disincentive in investing resources for the long-term sustainability of land

- (ii) Special attention towards technical training to women on land degradation, the impact of land use pattern, multi-cropping, agroforestry, methods of sustainable



agriculture, scientific methods and use of technology is missing

- (iii) There is no handholding strategy to support small and marginal women farmers in accessing irrigation technology, linkages with the agri-product market and alternative livelihoods to reduce dependency on land, which leads to further land degradation.

It is important to build provisions for women farmers, especially in agriculture, livelihoods and forest-related programmes.

Women farmers are often clubbed with men folk assuming their disabilities are the same as men.

Addressing the Needs of Women Farmers in Implementation of SLEM

- Facilitating legal ownership of agricultural land belonging to women headed households.
- Ensuring tenurial rights for women tenants and sharecroppers.
- Specific training and capacity building for women farmers as per their needs on measures to improve land and soil health, multi-cropping, agroforestry, sustainable agriculture practices, and technological innovations.
- Facilitating access to institutional credit, budgeting credit for women separately.
- Ensuring fair wage for women agricultural labour.
- Alternative livelihoods for small and marginal women farmers to reduce the chances of overusing of unproductive land.
- Identifying and removing bottlenecks for women farmers in linkages with agri-product markets.

Action to be initiated by the Ministry of Agriculture and Farmers Welfare in coordination with the states

12.5.4 Management of Village Common Property Resources (CPRs)

Justification: People among rural communities, particularly small and marginal farmers, landless, pastoralists and women, are dependent on local CPRs for fuel, fodder, water and grazing of livestock. CPRs provide livelihood support to about 75 million of the rural population in India. Despite the value to local communities, the common property resources are also under threat of encroachment, misuse and degradation. Programmes under forests and agriculture sometimes do prescribe interventions for the development and regeneration of CPRs. However, there are major gaps in its on-the-ground implementation:

- (i) Apart from equitable access, encroachment and diversion of CPRs is a major challenge, prevention of which has not been possible under the existing

governance structures.

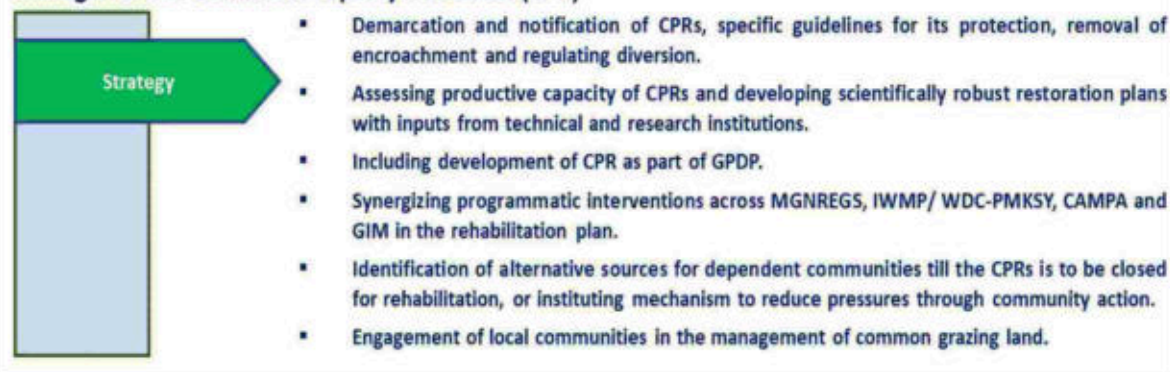
- (ii) Viewing CPRs in an integrated manner to acknowledge their role in maintaining livelihood and biodiversity lacks in sector programmes.
- (iii) Alternatives to the communities' dependency on CPRs are not built in the programmes taken up for their restoration. Consequently, the much needed temporary rest to these CPRs is not forthcoming, which leads to suboptimal outcomes.

Special attention to the management of CPRs, along with support to institutions, is required.

Weak institutional oversight on CPRs is leading to their appropriation or total misuse.



Management of Common Property Resources (CPR)



Action to be taken by the Rural Development Department in consultation with the Ministry of Environment, Forest and Climate Change and the Ministry of Panchayati Raj

12.5.5 Implementation of PESA

Justification: PESA vests the decision-making power in the Gram Sabha and Gram Panchayat in four areas that are related to SLEM: land acquisition, minor minerals, minor water bodies and minor forest produce (MFP). It also recognizes the customary rights of people on common property resources of forest and water. There are consequences to SLEM depending on how PESA is being implemented in the state.

The implementation of PESA requires compliance of the state legislations with PESA in the states that have Schedule Areas. The states are in varying stages of compliance:

- (a) Compliance of the State Panchayati Raj Act with PESA – All states have completed compliance with Section 4 of PESA except Jharkhand and Madhya Pradesh, where compliance is pending on the ownership of MFP.
- (b) Compliance of subject laws related to land acquisition, forest produce, mines and minerals, and agri-product market with PESA – Only Gujarat has completed compliance. Andhra Pradesh and Telangana are yet to initiate the compliance process and other PESA states are yet to complete the compliance process

- (c) Some states have vested the powers given to the Gram Sabha/Gram Panchayat under PESA at the higher level of the panchayat. The subject areas in which such diversion has taken place include local development plans and resources for such plans, including the tribal sub-plan, land acquisition, mining of minor minerals and management of minor water bodies. This diversion thus excludes the Gram Sabha and Gram Panchayat from decision-making on local ecological and livelihood resources. Consequently, engaging the local governance institutions in conservation and management of local resources gets limited.

Since PESA seeks to empower the Gram Sabha and Gram Panchayat, its implementation also requires people to be aware of the laws as well as to have information about the programmes so that the Gram Sabha and Gram Panchayat can make informed choices. A sustained effort to build the requisite knowledge base and governance skills of the tribal communities has not been undertaken by the state agencies responsible for tribal development.

Given the subject area under PESA's domain and its relationship to SLEM, its implementation will have a direct bearing on how natural resources in tribal areas are managed.



Implementation of PESA

Renewing Thrust to
Implement PESA

- Compliance of the State Panchayati Raj Acts and the State Subject Laws with PESA in the states where it is pending.
- Rectification of ambiguities in PESA in the states that have to led divesting/ diluting the power of Gram Sabha/ Gram Panchayat.
- Collaboration with NGOs and academic institutions in the Vth scheduled areas to develop a capacity building plan for the tribal communities.
- Running campaign to educate the communities for their rights and duties in the context of SLEM.
- Sharing local level data and scientific evidences to empower decision making.

Action to be taken by the Ministry of Panchayati Raj and the Ministry of Tribal Affairs



CHAPTER 13



Roadmap for Institutionalizing SLEM



The roadmap identifies the key nodal or initiating agencies for each of the action points, their role, agencies that they would require support from, areas of support and timeline wise breakdown of milestones are as under:

Objective:

- (ii) Achieve Land Degradation Neutrality
- (iii) In areas which nonetheless are impacted by land and ecological degradation, lessen the anthropogenic drivers of such degradation as well as manage the socio-economic fallout of the same.
- (iv) Incorporate cost of land and ecological degradation in the economic choices that are made by government, communities and other agencies.

Goal for the Roadmap for Institutionalizing SLEM:

- (vi) Government departments/ agencies understand the implication of their policy and programmatic actions on sustainable land management.
- (vii) They are able to address concerns related to sustainable land management while making policies and programmes.
- (viii) Enablers i.e., relevant data, science-based understanding and costs implications for action or inaction are established to support agencies in decision making.
- (ix) Adequate actions in proportion to the intensity of the

problem are taken to address the challenges due to land and ecosystem degradation through committed resources and coordinated interventions.

- (x) Knowledge and knowhow regarding SLEM is widely available in easily accessible mode to all stakeholders.

Given the criticality of actions required to tackle land degradation and also that the target period for achieving restoration of 26 Mha degraded land is 2030, most of the activities would have to be taken up in the short to medium term. Achieving the milestones in three to five years will give adequate time for the interventions to be grounded and produce measurable results by 2030.

The recommendations have also been listed in an order of priority with (i) activities which are important but would require a longer time frame for implementation, and (ii) activities which would require less time to ground but are high impact activities.

Certain recommendations lie within the domain of States; therefore, flexibility would be important for the States to action the recommendations, but a higher-level coordination by the MoEFCC or the concerned central Ministry/ Department would be necessary.

The recommendations which are relatively easier to implement and would convert to results faster have also been identified as follows:

Actions with a shorter roadmap	Actions needing sustained support
<ul style="list-style-type: none"> Arriving at a consensus definition of wasteland/ degraded land Target setting for LDN Framework to monitor LDN Digitization of Forest Maps Mapping and Protection of Wetlands Prioritization in afforestation on degraded forest land National Portal for Agroforestry Enabling ecosystem for growing trees Standing Committee on Land Management in Panchayats Develop a Center of Excellence for Sustainable Land Management Common Planning Tool for MGNREGA and Watershed Projects Contributing to LDN and NDC through greening of Highways 	<ul style="list-style-type: none"> Develop a specific project on SLEM at the national level Focus on development of "Forest Fringe Villages" Increasing funding for forestry programmes Policy on development of grasslands and grazing lands Special scheme for development of grasslands and grazing lands Revival of Land Use Boards Improving quality of planting material in afforestation programmes Special provision for MGNREGA in Tribal and Forest Fringe Village areas Subsidy specific study on Agriculture Management of Village Common Property Resources (CPRs) Interventions to reduce Forest Fires, invasive species, pest and diseases in forests area Enforcement of Sand Mining Guidelines, 2020

Figure 32. List of prioritized recommendations

Detailed recommendations of roadmap are given in Table 33.



Table 33. Roadmap for institutionalizing SLEM prioritized in terms of impact

S. No.	Recommended Strategy	Nodal Agency	Role of Nodal/ Initiating Agency	Supporting Agencies	Role of supporting Agencies	Capacity Building Needs	Implementation	Timeline				
								3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year
1	Develop a specific project on SLEM at the national level	MoEFCC	Design project, Seek approvals for funding	ICFRE institutions	Provide data research and learnings to develop project	Support by experts in concept design	MoEFCC	3 months: Develop project proposal after analysis of scientific data, identify landscapes to be covered under the project with interaction of stakeholders, and discussion with probable funding agencies. 3 to 6 months: Seek approvals 6 month to 1 year: Implementation 1 to 1.5 year: Implementation 1.5 to 2 year: Implementation > 2 year: Implementation > 3 year: Implementation	Critical activity: <ul style="list-style-type: none"> Development of the concept. Which should reflect the multi sectoral and multi discipline approach, integrate learnings on SLEM in the project components, and ties multi-sectoral agencies together in implementation. Funding arrangement with technical assistance providers. 			
2	Focus on development of "Forest Fringe Villages"	MoEFCC	Develop concept, bring Rural Development, Agriculture and Skill Departments together for development of scheme, committing funds	MoRD, MoAFW, Ministry of Skill Development and Entrepreneurship	Identification of applicable schemes to be dovetailed for focussed implementation	Orientation of partner Ministries, Line Departments in the States; Development of institution at state level for evidence-based planning and for development of projects for FFVs	State Forest Department (lead for planning and monitoring), Rural Development Departments' Agriculture Department in States	Development of criteria for defining FFV for the purpose/ research and collection of secondary data/ Designing of primary data collection plan to fill gaps Development of scheme and discussion with stakeholders/ Development of project Baseline Approval of funding and implementation Midterm-evaluation	Critical Activity: <ul style="list-style-type: none"> Identification of target landscape and implementation mechanism. Support with local level data on the targeted FFV's dependence on forests and on losses due to degradation and land use change which could be avoided with project intervention. 			



S. No.	Recommended Strategy	Nodal Agency	Role of Nodal/Initiating Agency	Supporting Agencies	Role of supporting Agencies	Capacity Building Needs	Implementation	Timeline				
								3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year
3	Increasing funding for forestry programmes	MoEFCC	Increase budgetary support; Donor funding; coordinate with private sector	-	-	-	MoEFCC	<p>3 months</p> <p>Consultations with Finance Ministry for increasing allocation</p> <p>3 to 6 months</p> <p>Include increased budget in demand for grants</p> <p>6 month to 1 year</p> <p>Finalize project funding document</p> <p>1 to 1.5 year</p> <p>Get necessary approvals and tie up funding</p> <p>1.5 to 2 year</p> <p>Start implementation</p>				
4	Develop a Center of Excellence for Sustainable Land Management	MoEFCC	Develop concept and detailed plan, provide funds to establish CoE	ICFRE	Provide inputs/house CoE		MoEFCC	<p>Critical Activity:</p> <ul style="list-style-type: none"> Tap sector funding programmes of International Funding Institutions. Apart from budgetary enhancement, exploring funding from private sector. Identify areas within forestry sector which requires enhanced funding <p>3 months</p> <p>Develop concept and DPR; Identify funding opportunity through IA route</p> <p>3 to 6 months</p> <p>Seek approvals and funding</p> <p>6 month to 1 year</p> <p>CoE starts functioning</p> <p>1 to 1.5 year</p> <p></p> <p>1.5 to 2 year</p> <p></p> <p>> 2 year</p> <p></p> <p>> 3 year</p> <p></p> <p>Critical Activity:</p> <ul style="list-style-type: none"> Identify most appropriate institutional design for the CoE. Forge international partnerships for impact, visibility and benefit from cross learning. 				



S. No.	Recommended Strategy	Nodal Agency	Role of Nodal/ Initiating Agency	Supporting Agencies	Role of supporting Agencies	Capacity Building Needs	Implementation	Timeline						
								3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
5	Arriving at a consensus definition of wasteland/ degraded land	MoEFCC	Take lead in bringing the various agencies and research institutions together to arrive at consensus definition; Develop subsequent guidance to be followed universally	Institutions under MoAFW, MoJS, Dept of Space; NGOs	Provide technical inputs, identify technical challenges and ways to address	Develop a LDN Cell at ICFRE	MoEFCC	3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
									Critical Activity: <ul style="list-style-type: none"> Arrive at a common definition after scientific discourse and practical considerations, important that a common understanding is achieved by all key expert institutions so that datasets are reconciled. 					
6	Target setting for LDN	MoEFCC	Identify Central programmes where LDN is also a component; Collate data on targets and achievements; Assign voluntary target to the concerned Departments	ICFRE	Collation of data	Develop an LDN Cell at ICFRE	MoEFCC	Identify central programmes that pertain to LDN, study their data and details on area covered	Collate data on respective Schemes	Distribute voluntary targets to concerned department; develop system for coherent reporting				
									Critical Activity: <ul style="list-style-type: none"> Study the main programmes contributing to SLEM, disaggregate their reporting and monitoring parameters, assess land coverage. Modifying monitoring and data capture formats to suit LDN reporting 					



S. No.	Recommended Strategy	Nodal Agency	Role of Nodal/initiating Agency	Supporting Agencies	Role of supporting Agencies	Capacity Building Needs	Implementation	Timeline						
								3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
7	Framework to monitor LDN	MoEFCC	Develop monitoring framework and data portal	ICFRE	Coordinate efforts behalf of MoEFCC	Orientation of Monitoring Framework to other Central departments connected with LDN, States	MoEFCC			Develop data reporting formats in consultation with respective Ministries and departments as per their programmes and schemes; develop IT based portal for reporting; identify and agree on who would take ownership of data reported				
Critical Activity: <ul style="list-style-type: none"> Engaging with relevant Ministries/ Departments of the Central government as well as the State governments. Develop flexible but compatible reporting formats. 														
8	Policy on development of grasslands and grazing lands	MoAFW	Nodal Ministry for policy development	MoEFCC Department of Animal Husbandry and Dairying/ ICAR	Initiate requirement based on data and research inferences; science-based policy prescriptions		State Revenue, Agriculture and Forest Departments		Develop draft policy	Undertake consultation, finalize draft, seek approval of government				
Critical Activity: <ul style="list-style-type: none"> Important that the policy is jointly owned by Agriculture, Animal husbandry, and Forests departments, ensure involvement and buy-in of the grazer community. Invest in communicating to the stakeholders for wider acceptability. 														
9	Special scheme for development of grasslands and grazing lands	MoAFW	Scheme development	Revenue Department/ Forest Department/ ICAR	Share data on status of grasslands	Collaboration with institutions working in grassland research, Agriculture Universities	State Agriculture, Watershed Management, Forest Department		Develop scheme document, guidelines and monitoring framework; develop criteria for site which would be taken up under the project based on cattle population, land availability, contribution to local economy and vulnerability from droughts etc.	Stakeholder consultation, finalisation of scheme and approval	Implementation and monitoring			
Critical Activity: <ul style="list-style-type: none"> Focused coverage and not thinly spread across geographies, identification of grasslands to be restored would be important To go hand in hand with livestock improvement, dairy development, livelihood diversification and behaviour change programme 														



S. No.	Recommended Strategy	Nodal Agency	Role of Nodal/Initiating Agency	Supporting Agencies	Role of supporting Agencies	Capacity Building Needs	Implementation	Timeline						
								3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
10	Digitization of Forest Maps	MoEFCC	Develop scheme; provide funds	State Forest Department	Monitor implementation	Develop GIS and mapping units at District level	State Forest Departments	Study of the current GIS / mapping capabilities of State forest departments, completion of information of status of coverage and quality of digitization, identification of key institutions which would play a role in the scheme implementation	Development of scheme and funding proposal	Approval and implementation	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
11	Mapping and Protection of Wetlands	MoEFCC	Engage with State Wetland Authority; Strengthen capacity	State Wetland Authority	Mapping and monitoring, prioritization for implementation	Awareness creation for line departments related to wetland; Demonstration and Pilot plans	State Wetland Authority	<p>Critical Activity:</p> <ul style="list-style-type: none"> Define technical standards, quality and use cases. Capacity enhancement in states to digitize maps as well as use them. 	Formation of local level community organisations specific to wetland management	Key wetlands identified for first phase, Wetland monitoring system established, development of wetland conservation plan, threats identified and government action to address taken	Data recording system put in place, orientation and capacity development of stakeholder departments continued	Implementation of plans and monitoring wetland status data		
<p>Critical Activity:</p> <ul style="list-style-type: none"> Document baseline of wetlands mapped, survey number coverage and land use in catchment areas. Guideline desirable to discourage land use change in wetlands above a threshold size and for management of wetlands in private land. Share information with community and other stakeholders in a transparent way. 														



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								3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
12	Prioritization in afforestation on degraded forest land	MoEFCC	Develop capacity at FSI and with States by providing guidance and funding, ensuring quality and consistency through SOPs and best practice	State Forest Departments	Develop prioritized, perspective plan in consonance with Working Plans	Development of SOPs for analysis of degradation in forest cover, establishing mapping units	FSI/ State Forest Departments	3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
<p>Critical Activity:</p> <ul style="list-style-type: none"> Enhancement of capacity of FSI and State Forest Department to conduct such assessment Sites within recorded forest area above a threshold to be identified where recent loss of canopy cover has been observed. 								Institute a team at FSI for taking up the project, Develop action plan	Capacity development of GIS and mapping units at the State, FSI to make available the forest cover analysis data with states	Gaps identified and plan to cover the gaps through additional interpretation of data	Complete the process of identification of degraded patches in demarcated forest area/ make available to field units for planning afforestation			
13	Enabling ecosystem for growing trees	MoEFCC	Identify policy changes and incentives framework for certification; policy on wood based industry and development of roadmap for self-sufficiency in wood	State Forest Departments	Development of wood based industry clusters	-	State Forest Department	Industry consultations at national and state level, identification of key interventions, consultations with government stakeholders on action points	Identification of clusters to be developed in the country; identification of policy changes required for import substitution; development of road map as self-sufficiency can be achieved at least after one crop cycle	Plan for facilitating forward and backward linkages; Develop mechanism for sourcing certified seedling and variety preferred by industry	Implementation of plans, support through incentives where required			
<p>Critical Activity:</p> <ul style="list-style-type: none"> View the agroforestry in conjunction with the wood-based industry. Harness role of IT, especially in the supply side for better inventory assessment and management Although subject lies with Agriculture Ministry, MoEFCC would have to play the lead role in initiating the process 														



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								3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
14	National Portal for Agroforestry	MoAFW	Develop portal in consultation with MoEF/ State Forest Departments	State Forest Departments, ICAR and ICFRE institutions	Providing verified scientifically robust data to be shared on the portal	CB modules to be included in the portal	MoAFW, State Forest Department	Development of Portal after user requirement study	Identifying institutions responsible for updating data; Populating portal with data	Commissioning and use, continuous updation of data and upgradation				
15	Improving quality of planting material in afforestation programmes	MoEFCC	Indicating as a priority area, Develop strategy and guidelines, including in a scheme, Providing funding	State Forest Departments	Implementation	Manuals and SOPs for seed selection; training; labs and equipment	State Forest Departments/ Forest Divisions	Carry out preliminary study of seedlings grown in forest department nurseries and source of such seeds/ extent of such seeds from known origin/ outcomes of tree quality development work undertaken by the states, central research institutes	Develop scheme document, seek inputs from states and take approval	Start implementation, inventory all the seed stands, seed orchards and plus trees				All the seeds used in the plantations should be of known origin
Critical Activity: <ul style="list-style-type: none"> Regular updation of data in the portal is key for increasing its utility and connect with users. The portal should be made self-sustaining by involving various business and service providers. 								Critical Activity: <ul style="list-style-type: none"> Incorporation of existing knowledge on QPM which is widely spread in State Forest Departments, and other institutions Involving the marker operators would be important as majority of seed supply is undertaken by them. 						



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								3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year
16	Common Planning Tool for MGNREGA and Watershed Projects	MoRD	Development of planning tool in consultation with MoEF, DoLR and MoAFW, monitoring usage once the Tool is deployed	State Departments of Forests, Watershed, Soil Conservation, Agriculture, Water Resources	Joint inputs for development of the design of the Tool, testing and mandatory implementation	Orientation of the key functionary of the agencies in the States; Manual of the Tool, training through appropriate medium	State Departments of Forests, Watershed, Soil Conservation, Agriculture, Water Resources	Start collecting user requirements after consultation and visit to selected states, develop concept document	Develop IT and web-based planning tool, develop manuals and CB modules	Capacity development of local teams, technical handholding	Implementation and upgradation as per requirement		
17	Contributing to LON and NDC through greening of Highways	MoEFCC	Initiates concept with MoRTH, Develop engagement advisories for State Forest Departments	NHAI, State Forest Department	Share phased plan for highway development with SFDs; Enter into MOU with SFDs, Monitoring		NHAI/ State Forest Departments	<p>Critical Activity:</p> <ul style="list-style-type: none"> Need analysis detailing would be critical for convincing stakeholder departments for such a common tool. Separate detailed study of the planning process for the key programmes should be undertaken and strengths and weaknesses of the existing process should be made part of the concept document. 	Develop phased plan for covering highways under development, consultations and MoU with state forest departments as implementing agencies	Implementation and monitoring			
								<p>Critical Activity:</p> <ul style="list-style-type: none"> Bringing state forest departments and NHAI together for discussions and understanding of requirements form each of the sides would be key to implementation of this recommendation. MoEFCC would have to facilitate such a dialogue. A robust monitoring system would increase mutual trust on the success of the intervention. 					



S. No.	Recommended Strategy	Nodal Agency	Role of Nodal/ Initiating Agency	Supporting Agencies	Role of supporting Agencies	Capacity Building Needs	Implementation	Timeline							
								3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year	
18	Special provision for MGNREGA in Tribal and Forest Fringe Village areas	MoRD	Issue necessary orders for revision of maximum persondays of employment per HH; Implementation in a phased manner	MoEFCC	Identification of Forest Fringe Villages; Prioritization of villages	CB for dovetailing with MGNREGS planning tool, Scheme for development of FFV and forestry programmes	MoRD	3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year	
								Collect data on forest fringe villages through existing data bases, CSO sample surveys, SECC data, MGNREGS job cards; Prioritization matrix for selection of landscapes based on social economic data (deviation from average)	Develop proposal for coverage of FFV in phased manner based on prioritization	Take up phased implementation; integration of livelihood security with the outreach by forest department, invigorating community participation in forest management, activities undertaken by FD for improving quality of forests	Conduct studies on impact on status of forest protection				
								Critical Activity: <ul style="list-style-type: none"> Identification of villages or clusters where the intervention would be implemented will build stronger arguments for its implementation as well as for successful outcomes. To truly reach the intended beneficiaries, resource or support organisations like NGOs and VO should be made part of the programme design. 							
19	Subsidy specific study on Agriculture	MoAFW	Develop research project, Commission research	Subordinate research institutions, Agriculture Universities	Coordinated research		MoAFW		Design study; identify institution	Conduct study	Share results through policy papers, seminars and workshops	Aim to use findings in future policy discourses			
								Critical Activity: <ul style="list-style-type: none"> Involving quality and reputed institutions for conducting the study for higher credibility. A communication strategy for wider dissemination of results so that the finding and possible solutions become part of discourses should be integrated into the intervention. 							



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								3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
20	Standing Committee on Land Management in Panchayats	MoPR	Issuing of guidelines/ advisory for the States	State Panchayat Department	Government order to formalize the formation of standing committee on land management	Thematic support to elected representative (ER), development of training material, handholding of ER local specific issues in coordination with State Forest Department	State Panchayat Departments	3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
21	Management of Village Common Property Resources (CPRs)	MoRD	Initiating discussion about treatment and protection offered in various laws and programmes	MoEFCC, MoPR	Development of specific guidelines for incorporation of CPR in their programmes, inclusion of development plan mandatorily in GPDP	Status report on CPRs would be a precursor work to initiate action	MoRD/ MoEFCC/ MoPR to suitably include actions points in programme guidelines	3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
22	Interventions to reduce Forest Fires, Invasive species, pest and diseases in forests area	MoEFCC	Audit of divisions vulnerable to fire to assess readiness; Strengthening of fires protection scheme, Funding	State Forest Departments/ FSI	Implementation of scheme; strengthening forest division; scientific assessment of damage by fire, invasive species and pests	Dissemination of leading practices globally, National seminars to share experiences	State Forest Departments	3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
Critical Activity: <ul style="list-style-type: none"> Incorporating the subject of SLEM in the capacity development programmes for elected representatives as well as the panchayat functionaries. Nudging states for issuing amendment orders. 								Critical Activity: <ul style="list-style-type: none"> Facilitate GPs to map and assess CPRs under their territorial boundaries along with the nature and extent of rights over the CPRs and prepare a status report 						
Critical Activity: <ul style="list-style-type: none"> Institutional capacity enhancement to respond to challenges is more important rather than short term programmatic interventions. Measures against pest and invasive species should be integrated in the forestry management interventions rather than being standalone attempts, except in case of pest and disease outbreaks. 								Critical Activity: <ul style="list-style-type: none"> Institutional capacity enhancement to respond to challenges is more important rather than short term programmatic interventions. Measures against pest and invasive species should be integrated in the forestry management interventions rather than being standalone attempts, except in case of pest and disease outbreaks. 						



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								3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
23	Focus on Wildlife Corridor Development	MoEFCC	Prioritize corridors based on scientific assessment; Increase funding support for corridor development to non-Tiger Reserve PAs	State Forest Department, WII, Local research institutions	Mapping of possible corridors based on data and imperative to link source populations; coordination with other departments for notification of corridor; scientific backstopping	-	State Forest Departments	3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
Critical Activity: <ul style="list-style-type: none"> Recognizing land use which is conducive to wildlife movement in the identified corridors, designing measures for disincentivising land use change. 														
24	Focused attention on rehabilitation of mined-out areas and abandoned mines	MoEFCC	Assessment of mining waste especially where forest land diversion has taken place; audit of EMP and mine closure plan	Ministry of Coal, Mines and Steel	Coordination with Mining units; Research and Development institutions under them; develop cost norms	Specialized training for implementation units at local level	State Forest Departments/ specialized institutions in partnership with vendors	Assessing current mechanism of monitoring EMPs, their strengths and weaknesses; identification of stakeholders	Identification of sites/ mines to be covered; finalizing implementing agencies and funding required	Audit of identified sites; Project formulation and implementation; monitoring				
Critical Activity: <ul style="list-style-type: none"> Problem of abandoned mines of both minor and major minerals have to be addressed and should not be left out. States should be involved so that illegal mines are also taken into the fold of the programme. 														



S. No.	Recommended Strategy	Nodal Agency	Role of Nodal/Initiating Agency	Supporting Agencies	Role of supporting Agencies	Capacity Building Needs	Implementation	Timeline					
								3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year
25	Strengthening involvement of students to fight land degradation	MoEFCC	Develop Scheme: Provide funds	Department of Higher Education, State Forest Departments, State Revenue Departments	Policy development, identification of land at local level; involvement of social forestry wings for development and maintenance of site	Awareness campaign, involves school teachers and students,	State Forest Departments/ Social Forestry Wings	Prepare scheme; state government to identify possible sites	Demarcation and notification of identified sites by state revenue department	Preparation of site development plan; identification of possible NGOs, corporates who would like to participate, signing MoUs with them; Development of IT based database with Colleges	Communication campaign; implementation and monitoring	> 2 year	> 3 year
26	Incentives for investment on land protection	MoAFW	Develop incentive scheme; Develop platform to capture beneficiary requirement; Link to Watershed and MGNREGS for provision of technical support and funding; Modalities for tying up credit to landowners	MoRD, DoLR	Provide funding and technical support; help in field inspections and reporting, preparation of beneficiary wide case; use secondary information for prioritization	Use farmers database and other schemes like PMKSY-PDMC, Watersheds and Fertilizer distribution	Agriculture Department in States	Develop scheme parameters and operational guidelines, Use existing farmer data base,	Develop portal to collect application from beneficiaries; Popularize scheme	Implementation starts, with bare foot engineers and barefoot hydrologists make plan for land protection of the beneficiaries, funding tied up from schemes like MGNREGA and Watershed Development	Implementation	Impact assessment	
Critical Activity: <ul style="list-style-type: none"> Tracking beneficiaries and users over long term will be required. Aadhar enabled portal could be developed Campaign to be run in schools and colleges and systems set up for smooth implementation. 								Critical Activity: <ul style="list-style-type: none"> Design of model interventions for various agro zones and soil types for ease of uniformity and monitoring. Use of IT portal to capture requirement from beneficiaries and subsequent management of workflow. 					



S. No.	Recommended Strategy	Nodal Agency	Role of Nodal/ Initiating Agency	Supporting Agencies	Role of supporting Agencies	Capacity Building Needs	Implementation	Timeline						
								3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
27	Enforcement of Sand Mining Guidelines, 2020	MoEFCC	Analysis of action taken reports; Monitoring mechanism; Conduct demand supply studies on use of sand; developing of alternatives; design incentives	State Governments	Enforcement, prosecution of infringers		State Governments Mining Departments, Law enforcement Agencies	Identification of critically vulnerable areas; assessment of compliance mechanisms and its strengths and weakness; assessment of demand and supply and strategy to fulfil gap	Preparation of action plan in coordination with Revenue, Police and Mines/ Geology Departments of states	Policy on use of substitutes, incentives or disincentives in active consultation with construction industry	Implementation and strict monitoring			
Critical Activity: <ul style="list-style-type: none"> Demand supply gap assessment and planning for alternatives which have least environmental impact. 														
28	Integrated Policy on land addressing land degradation	MoEFCC	Develop white paper and draft policy document; consultations	MoAFW; MoJS	Provide data, sector inputs on gaps and action points	Set up a policy unit at nodal agency	Central Government; State Departments on Revenue, Forests, Agriculture and Water	Initiating meeting with stakeholders	Develop white paper	Put research data on board	Develop draft policy document	Issue policy statement		
29	Strengthening Forest Policy	MoEFCC	Policy analysis, gaps, consultation; drafting	State Forest Departments, Industry, civil society	Support gaps with data and evidence	Set up a policy unit at nodal agency	Central and State Government Departments	Work already ongoing- stakeholder consultation for wider participation		Develop revised draft of Forest Policy				



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								3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
30	Disincentivizing overuse of water for agriculture	MoJS	Develop concept based on evidence and studies; Develop draft and finalize in coordination with stakeholders	MoAFW, Ministry of Power	Initiate proposal jointly; Estimate impact on incomes of farmers and ways to mitigate impact; Estimate funding requirements	CB of the officials of the concerned department for effective communication to farmers; Transparency in sharing local level resource data	MoJS, MoAFW, MoP	3 months	Improving efficiency of irrigation projects; Identify affected communities and measures to lessen impact of crop substitution	6 month to 1 year	Initiate Electricity sector reforms; Share data on water balance study; initiate campaign	1.5 to 2 year	Share data on water	> 3 year
31	Legislation on ecological flows in rivers	MoJS	Draft notification/legislation in consultation with states and other stakeholders	MoEFCC	Support with scientific evidence, outputs of research studies	Secondary research for development of sound scientific justification	MoJS	Initiate the review process, discuss role of resource institutions to work with communities	Collate studies and data from river monitoring	Develop white paper based on thorough water use study of the key rivers covered under study	Legislation passed and enforced			
32	Strengthening Community Participation in SLEM Programmes	MoEFCC	Develop agenda, coordinate with MoPR; Review existing programmes and strengthen component for mobilizing community participation	MoPR	Include CB activities in MoPR Programmes like RGSA, provide guidance to States	Orientation training and IEC material both for implementors and community	MoEFCC/ MoPR	<p>Critical Activity:</p> <ul style="list-style-type: none"> Fixing minimum flows in critical stretches of rivers in the country based on scientific studies. 						
								Initiate review of existing guidelines and processes; discuss role of institutions working with communities	Stakeholder consultation on draft strategy and action plan	Integrate into SLEM program mes; develop CB material	Implementation			
								<p>Critical Activity:</p> <ul style="list-style-type: none"> The social and political barriers to community participation are required to be identified and addressed. Information sharing and transparency is critical for trust building, so that people remain interested in participation. 						



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								3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
33	Integrating SLEM with panchayat development plans	MoPR	Amendment to GDPD guidelines, issuing directions	MoEFCC/ SFDs	Sharing draft guidelines from their side with MoPR based on best practices from JFM, resource mapping at GP level; developing pilots involving SFDs	Develop capacity development material	Panchayat Department/ SFDs	SLEM to be included in the GDPD formats; Forms to be prepared for addressing data on status of land degradation and management; instruction to line departments for sharing data with GPs for integration in GDPD	Appropriate CB modules to be developed with MoPR and MoEFCC dissemination during capacity development effort	Achieve integration of SLEM with GDPD planning process				
34	Linking National Water Policy to land and forest.	MoJS	Nodal for policy development/ amendment	MoEFCC/ institutions under it like ICFRE	Develop proposal and draft based on research, inputs, and evidence		Development of concept, statement of object and draft: MoEFCC in coordination with ICFRE	Draft to be prepared with the support of MoEFCC	Putting in place mechanism for evaluation of policy measures					
35	Forest Carbon Assessment	MoEFCC	Develop plan, guidelines, manuals; funding criteria; monitoring and data recording platform, integration with climate programme, funding	ICFRE/ State Forest Departments/ Agriculture Universities	Develop manuals and guidelines; demonstration at selected sites; Establishment of soil labs	Training at the State HQ and District level, quality	State Forest Departments/ Forest Divisions	Set up permanent grids within 5 sq km. by the end of one year based on the digitized forest maps	Ground truthing and finalization of the sampling points, develop digital inventory system for storing data and for analysis	Start collection of data from field, States to identify the laboratories for analysis of sample	Cover first round in the end of year 5			
Critical Activity: <ul style="list-style-type: none"> Sharing of development plan by the main department with GP needs to be institutionalized. 								Critical Activity: <ul style="list-style-type: none"> Development of SOPs and operation manual Database management and analysis. 						



S. No.	Recommended Strategy	Nodal Agency	Role of Nodal/ initiating Agency	Supporting Agencies	Role of supporting Agencies	Capacity Building Needs	Implementation	Timeline						
								3 months	3 to 6 months	6 months to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
36	Collaboration with Research Institutions	MoEFCC	Identify institutions on basis of themes or geography; Develop modalities for collaboration; Develop network of institutions	ICFRE Institutions, State Universities, State Forest Departments	Disseminate key learnings; Conduct Seminars; Rejuvenate Research wing in Forest Departments	Run internships and Research studies within Forests in collaboration with FRI and other Universities	State Forest Departments at Circle level	Collation of the knowledge products developed which are relevant to SLEM, selecting some successful projects in the field and documentation of success stories	Development of knowledge sharing platform, reviewing existing schemes and put enabling provisions for collaboration with research Institutions	Implementation				
37	Diversion of Forest Land – improving monitoring and assessing impact post land diversion	MoEFCC	Development of monitoring framework; Ensure compliance, take action as per law in case of violations	State Forest Departments	Inspection, reporting	Develop monitoring SOP; train and develop local monitoring units; guidelines for initiating legal action in case of violations	MoEFCC State Forest Departments	Strengthening mechanism for post approval monitoring, development of IT based monitoring and reporting tool	Identification of certain projects where FCA clearance was accorded 10-15 years ago, designing impact assessment study post forest land diversions, identify Institutions who could do such studies	Award Studies	Analyse and discuss the findings from the studies, use findings to reassess norms for CA, NPV and penalty in cases of violations	Use study report for policy level readjustments		
Critical Activity: <ul style="list-style-type: none"> Integration of research findings in the programmes for SLEM Interactions and engagement of implementing departments with research institutions on regular basis through conference of implementers. 								Critical Activity: <ul style="list-style-type: none"> Developing models for valuing ecosystem services provided by land and forests. Assessment of depletion of forest stock within and outside the diverted area would be a critical information. 						



S. No.	Recommended Strategy	Nodal Agency	Role of Nodal/ Initiating Agency	Supporting Agencies	Role of supporting Agencies	Capacity Building Needs	Implementation	Timeline					
								3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year
38	Implementation of PESA	MoPR	Renew campaign for implementation of PESA, bring out status report, conduct seminars, engage with States; Support states in developing draft PESA rules	MoTA	Bring out status report, conduct action research on ground, share best practices and experiences from states where PESA has been implemented	Workshop and seminars with States, civil organisations	MoPR	Review of the existing status of PESA by collecting information from States; document bottlenecks	Initiate the process of drafting of the status report; develop a framework for campaign, action research, and engagement with civil society organisations	preparation of status report; regional workshops and seminars; start campaigns; develop capacity building plan	consultation with States; start implementation by issuing executive orders; support States in drafting rules; capacity materials and training manuals	Engagement with States for implementation; capacity building trainings	Implementation
39	Mechanism for measuring SDG indicators related to SLEM	MoEFCC	Break down of SDGs target for the identified indicators to States; Develop additional indicators to cover objective of SDG-15	State Forest Departments	Break down of SDGs target for the identified indicators to sub-district units	Manual on de-constructing Sustainable Development Goals with respect to SLEM; Explain indicators and baselines, data capturing methodologies	MoEFCC/ State Forest Department	Breakdown national targets, identify institutions to collect data; identify gaps in capacity to collect data	Address gaps in data collection mechanism	Start reporting	Start reporting	Monitor progress and feedback learnings into new or existing programmes	
40	Participatory and decentralized groundwater management	MoJS	Issue of Framework Legislation empowering WUA and prescribing power, functions and duties	Central Ground Water Board, Central Ground Water Authority	Provide data and previous experience, use best practices to draft legislation; develop training and CB programmes for WUA; Provide data on water resource for use of WUAs in developing water budget and water accounting	WUA supported for water budgeting	Water Resources Department and Watershed Development in States; Water User Associations	Breakdown of state level SDG goals and targets and fixing similar goals for district level units.	Development of state level SDG goals and targets and fixing similar goals for district level units.	With wider consultations, urge states to adopt the legislation; Develop capacity development plan for WUA; Data sharing local information on water availability	Support WUA through existing programmes; Strengthen parichayats bodies for better integration of WUA and PRI		
								Critical Activity:					
								Establish mix of incentives and disincentives, communication campaign, and sharing water related data at the local level in a transparent form with the communities.					



S. No.	Recommended Strategy	Nodal Agency	Role of Nodal/Initiating Agency	Supporting Agencies	Role of supporting Agencies	Capacity Building Needs	Implementation	Timeline					
								3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year
41	Strengthening State Biodiversity Boards	MoEFCC	Assess the institutional strengths and weaknesses; engage with SFDs; Propose amendments in BD Act if required Increase support to SBBs	State Forest Departments, SBB, NBA	Identify key constraints; redefine role of SBBs	-	State Biodiversity Boards	Develop proposal and estimate funding requirement, outputs and outcomes of funding, setting targets in mutual consultation of NBA and SBBs	Start funding to SBBs/ take up concurrent monitoring on meeting agreed milestones				
Critical Activity: <ul style="list-style-type: none"> Increasing resources and research orientation of the SBB for developing bioresources related data base. 													
42	National Carbon Market	MoEFCC	Developing the structure of the National Carbon markets in consultation with stakeholders, studying global examples	Department of Industries; Department of Corporate Affairs	Facilitate consultations and develop guidelines for respective sector players; Consultation with corporates for finalization of timelines for implementation, guidance on carbon neutrality; eligibility criteria for corporates which are to be covered	Joint action group of MoEFCC, corporate entities and research institutions	Eligible corporates	Consultations with stakeholders	Formulation of policy	Legislation/ issuing guidelines			
Critical Activity: <ul style="list-style-type: none"> Fixing a price for carbon for the Indian economy. Applying the cost of carbon to selected sectors initially to fund mitigation efforts against climate change. 													
43	Revival of Land Use Boards	MoRD/ DoLR	Issue advisory to states; include revival as part of a programmes	-	-	-	DoLR	Assess current status of SLBs in States; Develop action plan for revival which includes defining role, constitution of board, functional relationship with other state level institutions, powers and function backed by suitable legislations	Engage with states through discussions, workshops and seminars	Aim for issue of necessary orders for revival of SLUBS			



S. No.	Recommended Strategy	Nodal Agency	Role of Nodal/ Initiating Agency	Supporting Agencies	Role of supporting Agencies	Capacity Building Needs	Implementation	Timeline						
								3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
44	Gender mainstreaming in SLEM policies and programmes	MoEFCC	Develop Framework specific for SLEM projects	MoRD, MoPR, MoAFW	Sharing experiences, best practices and evaluations reports	Sensitization on the concept, designing campaign for larger participation of women	MoEFCC	3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year
45	Addressing needs of Women Farmers in implementation of SLEM	MoAFW	Developing guidelines and action points to be implemented across Departments/ States	MoEFCC	Accessing current status; data and analysis; Implementation, Developing capacity development material	Capacity development of staff on the aspects of women farmers; Sensitisation of field level staff; Identify champions	MoAFW	3 months	3 to 6 months	6 month to 1 year	1 to 1.5 year	1.5 to 2 year	> 2 year	> 3 year



CHAPTER 14



Capacity Development for
Policy and Institutional Mainstreaming of SLEM Approaches



Capacity of the institutions concerned to implement the recommendations would be as critical for achieving the desired results. Capacity development is an important aspect for developing knowledge, skills and attitudes of individuals and institutions. Improved capacity leads to a better understanding of the issues at hand, leading to better outcomes, both at the personal as well as

organizational levels.

The strategic interventions needed for integrating SELM as a policy-making approach in the country and the programmatic interventions to integrate SLEM in the current programmes and schemes are highlighted as under.

14.1 Gaps in Current Capacities for Addressing SLEM

Capacity building for mainstreaming SLEM will have to be approached strategically. The action points will have to be finetuned as per the requirement of various stake holders in view of the current capacities, expected roles they are to play, and the gaps that exist both at the individual stakeholder as well as the institutional

ecosystem level. Mapping of institutions, capacity gaps and interventions to address the gaps will required. This has to be backed up with necessary financial resources for actioning these interventions.

Gaps in the current capacities can be broadly classified as the matic or subject-specific gaps and institutional gaps.

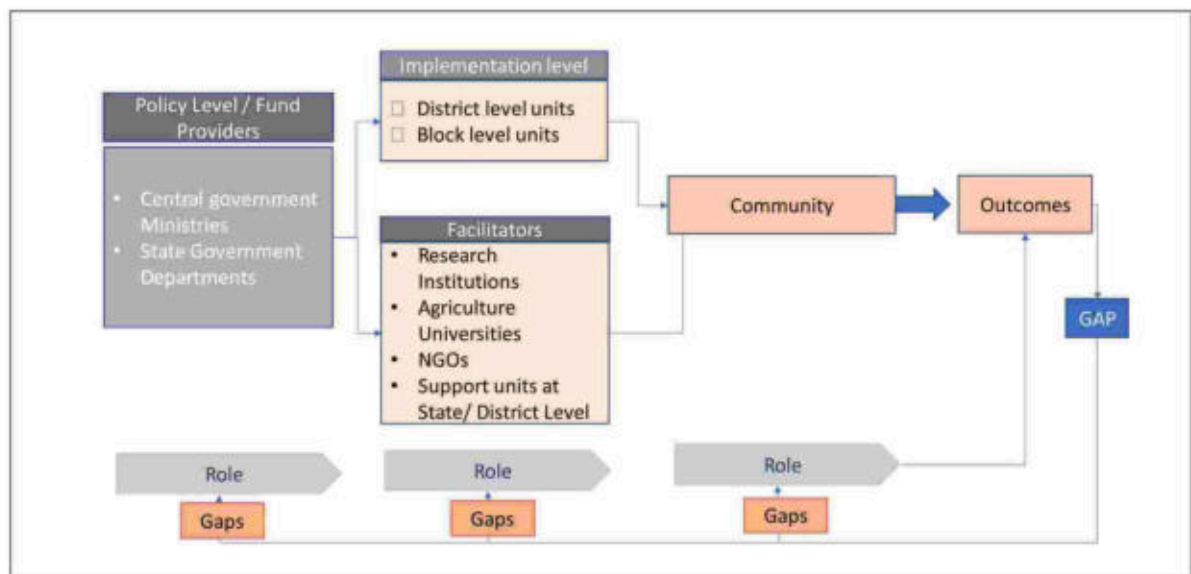


Figure 33. Mapping of institutions for the study of capacity gaps

14.1.1 Thematic Gaps

A. Conceptual gaps - treating land, water and vegetation: Land and ecosystem management has been practised in various forms in the country for many centuries. However, most of the interventions have been practised at the community level with limited state intervention. The advent of the century precipitated the understanding for a requirement of state intervention to tackle some of the key

problems of the day, namely drought and famines. As the knowledge of natural systems, economics, and social organization and behaviour grew, more and more interventions started being led by the welfare-oriented state. Many of these knowledge and best practices propagated into large-scale government programmes to tackle the degradation of land and ecosystem.



However, due to the existing institutional structure and functioning of the government machinery, the issues have been primarily treated in isolation, with each sector having a different view of such problems and their solutions as per their core mandate. It has led to conceptually understanding land and ecosystems differently, and this understanding has oriented policy-making, institutional structures and implementation architecture till date – with the two being treated separately in most cases, with a few exceptions of protected area management where the context provided an opportunity to treat land and ecosystems together sustainably as a unit. SLEM has gained traction in recent times with the evolution and greater acceptance of the landscape management approach.

A holistic view of the ecosystem, its dynamics and interplay with humans and their development needs has been necessitated. It will require a common conceptual framework to be accepted by the various sectors; which needs to be formulated and widely promoted through training programmes and awareness generation at all levels, the officialdom, providers of finance and the community at large.

B. Lack of standardization of approaches and frameworks: SLEM is still a relatively new approach, and a few people are conversant with it. As an approach, it is yet to become an acceptable terminology or common parlance in NRM circles. The standardization of definitions, approaches and frameworks is still a work in progress. As of today, there is no ready toolkit or guideline available for integrating SLEM in projects.

C. SLEM not part of training or study curriculum: SLEM today is not part of the training curriculum of training institutions of either the state government or the Centre. Little research is being conducted on SLEM in the context of the cross-cutting and complex interplay of systems. The integrated approach to SLEM is also not part of the curriculum of premier training institutions on NRM, Forestry or Social Sciences.

D. Lack of research and wider dissemination: There is a need to build SLEM conceptually and thematically through action, policy and academic research. However, it is imperative that the current understanding, lessons and impacts of SLEM approaches are shared with practitioners and policymakers to build their perspectives on SLEM.

Action: Training institutes for higher and provincial civil services, professional colleges, ICAR & ICFRE Institutions

14.1.2 Institutional Gaps

SLEM adopts a multi-stakeholder approach requiring various departments to work together at multiple levels to make it successful. SLEM entails a higher degree of teamwork and coordination across departments, which given the current scenario of departments working independently, will entail learning new ways of working. Although there are experiences of one programme converging with other programmes, but the convergence is more from the funding perspective. In SLEM, coordination goes beyond funding convergence and

focuses on achieving higher-level common programme goals and objectives. Stakeholder capacities need to be developed on effective teamwork and coordination and focusing on the big picture to achieve programmatic goals and objectives.

More specifically, convergence has to be affected right from the choice of target areas, complementing activities and coordinated implementation, through a common planning methodology, sharing of data and information and monitoring of outcomes beyond simple outputs.

Action: All key Ministries implementing programmes for SLEM



14.2 Strategic Interventions for Mainstreaming SLEM

The strategy proposed is on the following main areas:

- Sensitization and awareness of Law and senior policymakers
- Capacity building of State and District level officers
- Capacity building of implementation level staff
- Development of functional capacities of support units and research organizations
- Development of a unit at the State level to take care of capacity building needs
- Involvement of resource organizations, i.e. NGOs, not for profit organizations, to support in reaching out and delivering quality training of a uniform standard
- Centre of Excellence on Sustainable Land at the National level to coordinate efforts

14.2.1 Capacity Development Strategy for Different Stakeholder Sets

A. Lawmakers and Senior Policymakers

- (i) Sensitization workshops for parliamentarians and state assembly representatives: Land is finite and a highly contested resource. It is also a sensitive issue with political ramifications. SLEM entails working on land. Intergenerational equity, a concept difficult to understand and even more difficult to implement, given the multifarious sets of community stakeholders and their different perspectives of how

much apparent benefits a group should forgo to maintain such equity, requires sustained sensitization of the key decision-makers.

Such sensitization should start from the top through day-long sensitization workshops on SLEM for parliamentarians and members of legislative assemblies. Such workshops may be repeated after reasonable and practicable intervals.

Action: MoEFCC in coordination with secretariats of various houses in the states or union territories

- (ii) Capacity development for senior policymakers and government officials: Senior policymakers both at the Centre and states need to be updated on key challenges related to land and ecosystems, how it affects the sectors they are responsible for, and SLEM approaches that take a holistic view on the issues and

possible solutions. Given that many solutions will require incremental changes from one regime to another for an extended period so that the community can accept them, this will require a long-term commitment from policymakers where such sensitization will bear results.

Action: Training institutions of various Central and state services

The key methods that can be followed for such sensitization of lawmakers and officials will consist of the following:

- **Workshops and conferences:** Updates on the recent trends and learning on SLEM can be gained through participation in national and international workshops/conferences on SLEM. These events

bring together researchers, policymakers and field implementors who will share their learning and insights on SLEM. To accomplish the objective, high-quality National and International level workshops on SLEM will have to be organized, for which a dedicated agency will require to be identified. The proposed Centre for Excellence for Sustainable Land



Management under the MoEFCC can be one such institution.

- **Exposure visits to learning sites:** Exposure visits to learning sites in the country or abroad where innovations related to SLEM have been implemented can be organized. The lessons imbibed through these successful demonstrations will change the perspectives of the policymakers and help in the mainstreaming of SLEM in the policies. The proposed CoE can be one of the institutions which can organize such visits. Good quality documentation of best practices, methodologies, human interest stories and development of case studies will have to be done to facilitate the preparation of content engaging with the participants.
- **Briefs of policy dialogues and research papers:** Policy dialogues and research papers are important sources of inputs for policymakers. Briefs on policy dialogues and research on SLEM should be shared with policymakers to feed them with the latest inputs
- **Learning from pilot projects:** Pilot projects are implemented with an objective of testing a new idea. The learning from pilot projects on SLEM can provide useful inputs to policymakers. Such pilots should try to replicate the implementation environment that a large-scale project will likely face

so that the outcomes and learnings are more relevant to scale up.

B. Implementation Level Officials and Elected Representatives:

- (iii) **Capacity development for state and district level officials:** This section of stakeholders will consist of senior officers managing the various programmes and schemes at the state level and officials at leadership positions like District Collectors, DCFs, heads of Agriculture and other line departments.

The capacity development on SLEM for these officials will also be through state or national level seminars and conferences, learnings from pilot experiences, as well as policy briefs. Capacity building at this level will mostly focus on appreciating landscape-level issues and enhancing planning capabilities. These training programmes will be more hands-on with exposure to technical tools and frameworks and institutions at the national and international level for collaboration on training programmes and exposure to SLEM.

Learnings from field visits will be an important component of such training. Coordination and handholding by research and technical institutions on methodologies, tools, frameworks, know-how and best practices will be critical at this level.

Action: State administrative training Institutes and the concerned department through research institutions, such as the National Institute of Hydrology, NIRD, and NGO partners

- (iv) **Capacity development of the field functionaries and frontline staff working on SLEM related projects:** The frontline staff working at the field level on SLEM projects should be trained on SLEM through structured module-based training, which focuses on imparting functional skills. Apart from structured instructional sessions, Capacity building (CB) efforts at this level will also include the development of tools and frameworks, manuals, instruction booklets, and process standardization, among others. Various media can be used for increasing the effectiveness of such programmes, i.e. peer learning,

mentoring, digital learning platforms, simulation and videos.

Appropriate training material and media content will be created for dissemination and use as per the needs of the functionaries on the ground to capacitate them to overcome day to day implementation level problems.

Such CB efforts should also include the project staff engaged on contract, especially on the ground level, and project-specific training materials should be developed with regard to project guidelines, process, roles and competencies.

Action: The concerned department through research institutions, such as the National Institute of Hydrology and NIRD, and NGO partners



- (v) Capacity development of the elected representatives of the PRIs involved in implementing SLEM related projects: The representatives of the PRIs engaged in the implementation of the SLEM projects need to be trained on SLEM. These training programmes will be part of the training undertaken by the SIRDs or their regional centres. Appropriate programmes and content development will be required, and this will have to be integrated into the capacity development programmes being carried out by the Panchayati Raj

Ministry. Specific training modules for the standing committee members on land management/forest should be developed and for members trained at the commencement of a new panchayat body.

The design of CB modules should be role based on a thorough Training Needs Assessment (TNA). Best practices on the development of such capacity building programmes and modules have already been developed by NIRDPR and can be suited for SLEM.

Action: NIRD, SIRDs

- (vi) Handholding autonomous district and tribal councils: Land administration in NE consists of a multilevel regulatory and institutional framework due to the special constitutional and legal position. The Autonomous Councils or the Village Councils that work as tribal self-institutions that are constitutionally empowered to control and manage land, forest, water and biological diversity neither have the capacity nor the mandate to ensure sustainable land use and conservation of natural resources.

The tribal councils have not been able to document the customary laws relating to land use and forest management as practised by tribes or existing within a village jurisdiction. The community tradition and rules of land distribution or community tenurial systems are also not documented except by scholars and researchers. The tribal councils have made very little effort in this direction, limiting the introduction of appropriate interventions that align with the community land management system.

Various types of land tenurial systems in the North Eastern (NE) states determine the allotment of land for Jhum, making it difficult to control despite the

understanding that the slash and burn cultivation is deleterious for the environment, soil, biodiversity, ecosystems management and conservation. The unchecked Jhuming has also resulted in challenges of food security and low productivity, for which interventions from within the communities have been easy and forthcoming.

The unique situation of the tribal councils in the NE requires special efforts towards their capacity strengthening.

Handholding of autonomous councils by the forest departments: The autonomous councils are legally and administratively in charge of community forests or un-classed forests in the NE states. As institutions of self-governance, they have also established forest departments that exercise administrative control. However, at the council level, forest departments are not well equipped and lack technical as well as administrative capacity to manage forest areas. Therefore, the council FDs need to be trained and their capacity needs to be built to prepare conservation plans and sustainable forest land use plans that can be implemented within their jurisdictions.

Action: MoEFCC, State Forest Departments and Autonomous Development Councils

C. Building Capacities of Support Units

Support units both at the state and district levels will be required to enable programme implementation in a scientific manner. It can be categorized as the following:

- a) Units supporting with GIS, interpretation of maps and satellite images and data from national portals on land degradation



- b) Units supporting with IT and other technology related infrastructure
- c) Wider user of IT-based reporting and monitoring systems for programmes management, which strengthens the institutional capacity of the programme implementation units

Developing such capacity will require proper investment in both manpower resources and equipment/ software applications with provision for maintenance and upgrade to reduce downtime.

Action: MoEFCC, State Forest Departments and Auction; Concerned line departments in states with support from the MoEFCC/State Forest Department/ Autonomous Development Councils

D. Establishment of a Central Capacity Development Unit at the State Level

A central unit coordinating efforts on capacity development needs is required at the state level. They will be responsible for conducting Training Needs Assessment, developing modules, testing, updating, SOPs for delivering capacity development programmes on the ground and monitoring the depth and coverage of CB efforts.

The unit will also decide on the best strategy to be employed on delivery for capacity development programmes. Accordingly, resources organizations consisting of extension arms of government institutions, NGOs and not-for-profit organizations can be engaged. The unit will also coordinate efforts with the training infrastructure and institutions existing under the Rural Development, Agriculture and Panchayat Departments of the states to optimize CB resources and learnings.

Action: State Forest Departments

E. Orientation of Young Civil Servants on the Aspect of Sustainable Management of Natural Resources

Sensitization of young civil servants early on in their careers is important to mould their understanding towards optimal and efficient use of natural resources. It has been observed that officials who have got the opportunity to work closely in the areas of land, water and watershed management, among others, at the early stages of their careers have

remained more appreciative of the challenges of the sector subsequently in their career.

Apart from the orientation that will happen at the respective training academies, to further facilitate the development of such orientation programmes, appropriate functions may be included in the job responsibilities at the Assistant Collector or equivalent level of officers in the initial stages of their careers.

Action: The administrative department of the concerned service officers, in coordination with the MoEFCC, DoPT and state line departments

F. Integrating SLEM in the Curriculum of Premier National Level Institutions

For exposing future professionals to the subject of sustainable management of land and water, at least one course on challenges and management approaches should be added to the curriculum of the premier

institutions in the country, such as IIM, IRMA, IIFM, WII, FRI, ISM, TISS, XIMB, XISS, XIDAS and Law institutes. Such exposure will trigger more empathy and understanding of future challenges, and some of the professionals may get further interested in aligning their profession to this subject area.

Action: The Ministry of Human Resources Development in coordination with the MoEFCC



G. Introducing SLEM in the School Curriculum

A review of the higher school curriculum reveals that due coverage is being given to the issue of environment conservation, including land degradation, pollution, water scarcity and climate change in the current school curriculum, which also covers the drivers of land degradation in some detail. However, there is little mention of technologies and approaches to be followed to address

the issue. Action incumbent upon the state as per international commitments for addressing climate change, land degradation, biodiversity conservation needs to be strengthened.

This initiative aims to make the future generation aware of the challenges faced in addressing the issues of land and ecosystem degradation and instil in them a sense of commitment towards the issues of the environment.

Action: The Ministry of Human Resources Development in coordination with the MoEFCC

14.2.2 CoE on SLM to play a Central Role in Capacity Development on SLEM

The MoEFCC is in the process of establishing a CoE on Sustainable Land Management. One of the mandates of the CoE is to develop capacities for achieving land degradation neutrality across the country. As part of this, it is proposed that the CoE will also design the overall capacity development strategy for mainstreaming SLEM in the country. The following will be undertaken for mainstreaming capacity development on SLEM:

- Assessment of capacity gaps and TNA on SLEM among different stakeholder sets in the country, including policymakers at the Centre and state levels, government staff engaged in programme implementation, PRI members, academic institutions, research institutions and training institutions, among others. This assessment will form the base for the subsequent training material development on SLEM.
- Development of training materials and training design on SLEM for different sets of stakeholders, based on the outcomes of the capacity gaps and needs assessment. Courses need to be tailored and packaged to meet the requirements of varying stakeholder sets.
- Identification of key sites taken up under the SLEM projects across the country and abroad for the documentation of best practices, along with a strategy, to adopt and mainstream innovations in SLEM

programmes. These learning sites can be destinations for potential exposure visits for different stakeholders.

- Collaboration with different training institutions in India and abroad for capacity development in the emerging areas of SLEM.
- Development of a set of training resources on SLEM that can be leveraged for providing quality training throughout the country. The CoE will also implement training of trainers (ToT) programmes, which will benefit the states.
- Collaboration with various NRM and rural management institutions in the country for integrating SLEM in the course curriculum of universities and developing specialized programmes in various thematic areas for professional colleges as per the needs of the sector, given that concerted efforts will be required to consolidate the efforts towards achieving the LDN targets for 2030.

The CoE will also undertake periodic assessments of existing capacity building initiatives on sustainable land management. It will help in the future design of the capacity building strategy and programmes on SLEM.

Action: MoEFCC

CHAPTER 15



Cost Estimations of the Recommendations for
Institutional and Policy Mainstreaming of SLEM in India



The recommendations for operationalizing SLEM consists of three sets of action points:

- (a) Policy development and harmonization
- (b) Institutional strengthening
- (c) Programme related interventions

Each set of recommendations will have a different implication on the financial requirement to implement this plan. Ordinarily, the policy recommendations may not require much upfront investment in financial terms except for the effort that will go into fresh research or collection of data. However, the overall financial impact of how the goods and services will flow post the policy implementation may change substantially, which can only be gauged at a higher level for now. For example, while the development of the policy for implementing cropping based on water availability may take minimal additional investment, but

the impact of actual implementation of the policy will mean substantial changes in the production of certain crops, which will affect the supply chain, prices, margins, and financial surpluses that various value chain players are used to currently.

Institutional strengthening can also be viewed from two perspectives; first, where new institutions are to be created and second, where realignments are to be made in the current arrangements of coordination and reporting. While in the former case, there will be significant financial ramifications for establishing a new institution (on human resources and infrastructure), in the latter case, not much direct financial impact is envisaged. However, existing institutions have a critical role in operationalizing SLEM and are working under sub-optimal resource conditions, which will require additional support if the institutional capacity gap is to be bridged.

15.1 Cost Estimation of Programmatic Interventions for SLEM

Funding has been estimated based on a 10-year period for the implementation of the roadmap. The cost estimation of

the programmatic interventions as per the roadmap is detailed as follows.

15.1.1 Increasing Funding for Forestry Programmes

Given the stagnation of funding in the forestry sector, a modest increase of a hundred percent of the current budgetary allocation for afforestation and development of

degraded forests related works is being proposed through Central government schemes.

15.1.2 Focus on Development of "Forest Fringe Villages"

The focus of the plan will be on the implementation of various existing programmes related to rural development, agriculture development, skill and livelihoods and fuel and energy in the FFVs with additional "top-up". The core of this intervention will be a bottom-up plan of outcome-based development to wean off the communities' over-dependence on the forest. The funds for additional works will be on identified development gaps impacting

sustainable natural resources management, institutions for local planning and monitoring and converging other ongoing schemes. Fuel substitution to cover local households through alternative biomass-based options is an important component suggested. The overall funding per year is estimated to be at Rs. 10 billion for development works and another Rs. 10 billion for fuel availability through biomass briquettes.



15.1.3 Digitization of Forest Maps

Funding has been suggested in proportion to the forest area in a state or UT. The allocation will be Rs. 70 million per state for the 20 large states and Rs. 50 million per state/UT for the rest of them.

15.1.3 Prioritization in Afforestation of Degraded Forest Land

A special project to be funded to the FSI for identifying plantable degraded forest land country-wide to assist the states in prioritizing areas to be taken up for afforestation and assisted natural regeneration activities. The project can be implemented jointly by the FSI and states forest departments. An additional funding of Rs. 50 million is proposed for this activity.

15.1.4 Improving Quality of Planting Material in Afforestation

Funds will be used to support a scheme to improve the quality of planting material, research institutions and research wings of the state forest departments, seed certification and national database of seed stands and mother trees and plus trees.

15.1.5 Interventions to Reduce Forest Fires, Invasive Species, Pests and Diseases in Forests Area

Activities supported will include establishing a centre of forest health in each state, auditing the states' capacity to tackle forest fires, monitoring forest fires, surveying and mapping of invasive species, monitoring forest pests and diseases, among others. Rs. 200 million per large state and Rs. 150 million for small State/UT to be allocated.

15.1.6 Forest Carbon Assessment

Funding support will be required for establishing permanent data sampling plots, with one per 5 sq km grid of forest area in the country and expenditure on sample collection, testing and measuring carbon, as well as for maintaining a secure database for which states will be supported partially by the Centre. Rs. 250 million is envisaged every year. The aim will be to cover one round of data collection by the end of 5th year.

15.1.7 Focus on Wildlife Corridor Development

The funding has been estimated for the development of five large corridors or 500 sq km landscape each year. Prioritization of areas to be taken up will be done. Funds will be utilized for putting in place an incentive mechanism for wildlife compatible land use, mitigating negative impacts of human-wildlife interactions, easements and monitoring mechanisms.

15.1.8 Strengthening State Biodiversity Boards

Support to State Biodiversity Boards (SBB) will be provided in terms of human resources and research staff, as well as funds to carry out high-quality studies and research on biodiversity-related issues contextual to the particular state. Support will also be provided to improve the peoples' biodiversity registers and implement the ABS mechanism. Rs. 500 million has been estimated to be the funding support to SBBs every year based on the estimation of the existing fund gap.



15.1.9 Mapping and Protection of Wetlands

The existing budget for the conservation of aquatic ecosystems is Rs. 484 million in 2021-22. Funding is proposed to be increased to Rs. 1.5 billion per year to map

and implement the conservation plan of the identified and important wetlands in a phased manner.

15.1.10 Develop a Centre of Excellence on SLM

The Ministry of Environment, Forest and Climate Change (MoEFCC) is the nodal agency in the Central Government for overseeing the implementation of India's environment and forest policies and programmes relating to the conservation of the country's natural resources.

The Ministry of Environment, Forest and Climate Change (MoEFCC) is the nodal agency in the Central Government for overseeing the implementation of India's environment and forest policies and programmes relating to the conservation of the country's natural resources.

15.1.11 Develop a Specific Project for SLEM and National Level

A large-scale project is envisaged at the national level, which will be implemented in selected landscapes that are highly vulnerable to land degradation and require priority treatment. The scheme will also support the creation of an institutional mechanism for the implementation of such a

multi-discipline, complex project and demonstrate the landscape level planning and implementation on the ground. Ambitious funding of Rs. 100 billion is being envisaged, and this project will become the cornerstone for tackling land degradation issues in the country.

15.1.12 Contributing to LDN and NDCs through the Greening of National Highways

While greening of national highways has become an integral part of the highway development projects, better planning of plantation on the land identified for highway development, involving the landowners along the highways and improving outcomes of the plantations is

important to get results. The funding envisaged will be for installing a robust monitoring system to enable more accountability on part of the plantation development agencies. The cost of plantations would be included in the project cost and are not factored here.

15.1.13 Focussed Attention on Rehabilitation of Mined-out Areas

The funding support is envisaged for building up a system to monitor EMP for mines or rehabilitation works taken up

for closed/abandoned mines.

15.1.14 Encouraging Involvement of Students in Fighting Land Degradation

The funding estimated is for implementing a graduation legacy programme, where students will be required to plant five trees each on the occasion of graduation. The implementation of the programme will be done jointly by the state forest department and the district administration. This programme can be incorporated under the overall "Van Mahotsava" celebrations, which is taken up by the

state. Every block will have one such site. The land for creating the "Van" will be identified by the administration, while the forest department will take up the responsibility of developing the site and keeping track of the plants planted by the students. The students will be encouraged to keep visiting the "Van" and monitor the growth of the plants planted by them. The estimated amount is based on the



number of students expected to be graduating every year distributed over the 7200 blocks and planting and maintenance costs.

About 185 million trees will be estimated to be planted each year, and the site will be maintained in perpetuity. An area of

25 to 50 ha in each block will be enough to cater to the requirement for the next 10 years. The programme will also aim to involve NGOs and corporate bodies in the implementation and sharing of resources.

15.1.15 Special Scheme for Development of Grasslands and Grazing Lands

The funding of a special scheme is envisaged that will support the inventorization of the country's grazing lands, assessment of the production status of such grasslands and prioritization of sites, along with interventions on the

ground, for the rehabilitation of the identified grasslands with the support and involvement of local people. The scheme will be implemented with the involvement of the state agriculture and forest departments.

15.1.16 National Portal on Agroforestry

The funding required will involve developing the portal, content and updating information along with data analytics on usage, connecting individual farmers with campaigns

and collecting data on initiatives, success stories and impact of the portal.

15.1.17 Subsidy Specific Study on Agriculture

A lump sum amount has been kept for this activity.

15.1.18 Participatory and Decentralized Groundwater

The funds will support the development of basin, sub-basin, watershed and sub-watershed level water balance studies and water budgets for local self-government

bodies. This exercise will be done with the help of science-based inputs. The initiative is envisaged to be implemented in a scheme format.

15.1.19 Common Planning Tool for MGNREGS and Watershed Projects

This will involve developing a planning tool, which can be used by the states across the two programmes and related

support services for smooth implementation.

15.1.20 Special Provisions in MGNREGA for Tribal and Forest Fringe Village Areas

Additional funding to support the increased number of person-days of employment per household in the identified FFVs is proposed. About 18% and 19% of the person-days of employment provided under MGNREGS are availed by people from STs and SCs, respectively. On average, about 50 days of employment is being provided per household

under the scheme on an annual basis. Based on the average wage rate of Rs. 200 per person-day and the doubling of person-days for about 20% of the MGNREGS workers living in the FFVs, the expected annual requirement of Rs. 93 billion is estimated.



Table 34. Cost estimation for implementing recommendations of roadmap

S. No.	Recommendations	Policy/ Institution/ Programmatic intervention	Amount (In Rs. Billion) / Year										Total	Primary Ministry/ Department responsible	
			1	2	3	4	5	6	7	8	9	10			
Action points for Forest and Environment Sector															
1	Accounting environmental effects of economic development	Policy	-	-	-	-	-	-	-	-	-	-	-	-	MoEFCC
2	Dedicated institutions for implementation of SLEM	Policy	-	-	-	-	-	-	-	-	-	-	-	-	MoEFCC
3	Integrated Policy on Land addressing land degradation	Policy	-	-	-	-	-	-	-	-	-	-	-	-	MoEFCC
4	Strengthening Forest Policy	Policy	-	-	-	-	-	-	-	-	-	-	-	-	MoEFCC
5	Increasing funding for forestry programmes	Programmatic	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	100.00	MoEFCC	
6	Focus on development of "Forest Fringe Villages"	Programmatic	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	200.00	MoEFCC	
7	Strengthening Forest Management		-	-	-	-	-	-	-	-	-	-	-	-	MoEFCC
8	Digitization of Forest Maps	Programmatic	0.70	1.00	0.50	-	-	-	-	-	-	-	2.20	MoEFCC	
9	Prioritization in afforestation of degraded forest land	Programmatic	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.50	MoEFCC	
10	Improving quality of planting material in afforestation schemes	Programmatic	0.50	0.50	0.50	-	-	-	-	-	-	-	1.50	MoEFCC	



S. No.	Recommendations	Policy/ Institution/ Programmatic intervention	Amount (In Rs. Billion) / Year										Total	Primary Ministry/ Department responsible
			1	2	3	4	5	6	7	8	9	10		
11	Interventions to reduce Forest Fires, invasive species, pest and diseases in forests area	Programmatic	2.50	2.00	2.00	-	-	-	-	-	-	-	6.50	MoEFCC
12	Forest Carbon Assessment	Programmatic	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	2.50	MoEFCC
13	Collaboration with research institutions	Institutional	-	-	-	-	-	-	-	-	-	-		MoEFCC
14	Biodiversity Conservation and SLEM		-	-	-	-	-	-	-	-	-	-		MoEFCC
15	Focus on Wildlife Corridor Development	Programmatic	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	25.00	MoEFCC
16	Strengthening State Biodiversity Boards	Institutional/ Programmatic	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	5.00	MoEFCC
17	Mapping and protection of Wetlands	Programmatic	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	15.00	MoEFCC
18	Enabling ecosystem for growing trees	Programmatic	-	-	-	-	-	-	-	-	-	-		MoEFCC
19	Diversion of Forest Land – improving monitoring and assessing impact post land diversion	Institutional	-	-	-	-	-	-	-	-	-	-		MoEFCC
20	Strategy for achieving LDN		-	-	-	-	-	-	-	-	-	-		MoEFCC
21	Arriving at a consensus definition of wasteland/ degraded land	Policy	-	-	-	-	-	-	-	-	-	-		MoEFCC
22	Target setting LDN	Policy	-	-	-	-	-	-	-	-	-	-		MoEFCC



S. No.	Recommendations	Policy/Institution/Programmatic intervention	Amount (In Rs. Billion) / Year										Total	Primary Ministry/Department responsible	
			1	2	3	4	5	6	7	8	9	10			
23	Framework for monitoring LDN	Policy	-	-	-	-	-	-	-	-	-	-	-	-	MoEFCC
24	Develop a Centre of Excellence for Land Degradation	Programmatic	0.43	0.57	0.47	0.45	0.52	-	-	-	-	-	2.44	MoEFCC	
25	Develop a specific project for SLEM at national level	Programmatic	100	100	100	100	100	100	100	100	100	100	1,000	MoEFCC	
26	Contributing to LDN and NDC through greening of National Highways	Programmatic	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	1.50	MoEFCC	
27	Focussed attention on rehabilitation of mined out areas abandoned mines	Programmatic	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	2.00	MoEFCC	
28	National Carbon Market	Policy	-	-	-	-	-	-	-	-	-	-	-	MoEFCC	
29	Enforcement of Sand Mining Guidelines, 2020	Institutional	-	-	-	-	-	-	-	-	-	-	-	MoEFCC	
30	Encouraging involvement of students in fighting land degradation	Programmatic	4.63	7.40	9.71	10.64	11.56	11.56	11.56	11.56	11.56	11.56	101.75	MoEFCC	
31	Establishing mechanism for measuring SDG indicators related to SLEM	Institutional	-	-	-	-	-	-	-	-	-	-	-	MoEFCC	
Interventions overlapping with Agriculture Sector															
1	Policy on development of grasslands	Policy	-	-	-	-	-	-	-	-	-	-	-	MoAFW	



S. No.	Recommendations	Policy/ Institution/ Programmatic intervention	Amount (In Rs. Billion) / Year										Total	Primary Ministry/ Depart- ment respon- sible
			1	2	3	4	5	6	7	8	9	10		
	and grazing lands													
2	Special scheme for development of grasslands and grazing lands	Programmatic	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	200.00	MoAFW
3	Disincentivising overuse of water for agriculture	Policy	-	-	-	-	-	-	-	-	-	-		MoAFW
4	National portal for Agroforestry	Programmatic	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.14	MoAFW
5	Incentives for investment on land protection	Policy	-	-	-	-	-	-	-	-	-	-		MoAFW
6	Subsidy specific study on Agriculture	Programmatic	0.10	0.10	-	-	-	-	-	-	-	-	0.20	MoAFW
Interventions related to Water Sector														
1	Linking National Water Policy to Land and Water	Policy	-	-	-	-	-	-	-	-	-	-		MoJS
2	Legislation on ecological flows in rivers	Policy	-	-	-	-	-	-	-	-	-	-		MoJS
3	Participatory and decentralized ground water management	Institutional/ Programmatic	4.00	4.00	-	-	-	-	-	-	-	-	8.00	MoJS
Institutional mechanisms and Decentralized Governance to support SLEM														
1	Common Planning Tool for MGNREGS and Watershed Projects	Institutional	0.25	0.10	-	-	-	-	-	-	-	-	0.35	MoRD



S. No.	Recommendations	Policy/ Institution/ Programmatic intervention	Amount (In Rs. Billion) / Year										Total	Primary Ministry/ Depart- ment respon- sible
			1	2	3	4	5	6	7	8	9	10		
2	Special provisions in MGNREGA for Tribal and Forest Fringe Village areas	Programmatic	93.00	93.00	93.00	93.00	93.00	93.00	93.00	93.00	93.00	93.00	930.00	MoRD
3	Revival of Land Use Boards	Institutional	-	-	-	-	-	-	-	-	-	-	-	MoRD
4	Integrating SLEM with GDP	Institutional	-	-	-	-	-	-	-	-	-	-	-	MoPR
5	Standing Committee on Land Management in Panchayats	Institutional	-	-	-	-	-	-	-	-	-	-	-	MoPR
Addressing Social Aspects for SLEM														
1	Strengthening community participation in SLEM programmes	Institutional	-	-	-	-	-	-	-	-	-	-	-	MoEFCC
2	Gender mainstreaming in SLEM policies and programmes	Institutional	-	-	-	-	-	-	-	-	-	-	-	MoEFCC
3	Addressing need of women farmers in implementation of SLEM	Institutional	-	-	-	-	-	-	-	-	-	-	-	MoAFW
4	Management of Village Common Property Resources (CPRs)	Institutional	-	-	-	-	-	-	-	-	-	-	-	
5	Implementation of PESA	Institutional	-	-	-	-	-	-	-	-	-	-	-	
Total			261	264	261	259	260	260	260	260	260	260	2,605	



15.2 Summary of the Estimated Financial Requirement for Implementing the Roadmap

The overall funding requirement for ten years is estimated to be Rs. 2,605 billion over a period of 10 years. The yearly distribution of the requirement will be as follows:

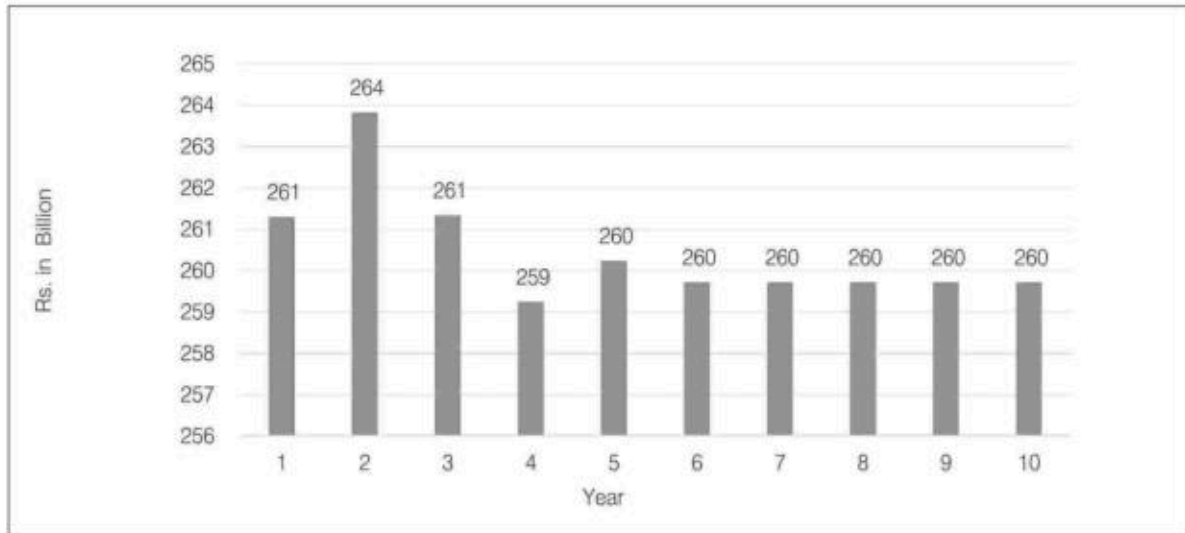


Figure 34. Ministry wise breakup of financial requirement

Further, the distribution of the financial requirement over the key Central ministries is as follows:

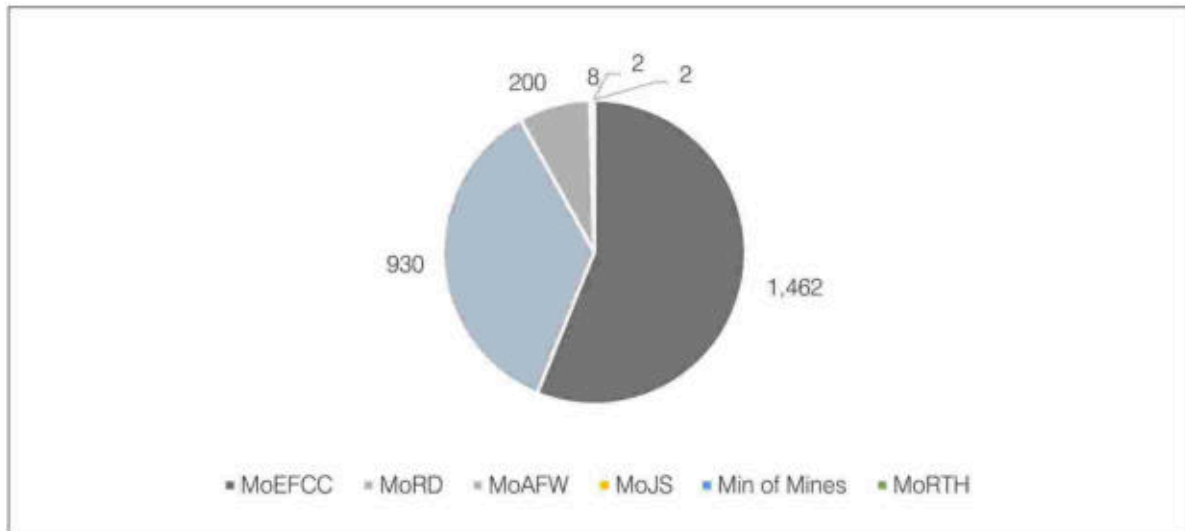


Figure 35. Ministry wise breakup of financial requirement (in Rs. Billion)



15.3

Cost-benefit of the Recommendations for SLEM Roadmap

The benefits of implementing the roadmap will include:

- (i) Improving resilience of farmers, especially small and marginal farmers, to droughts and incidents of heavy rain through the protection of soil fertility and diversification of incomes
- (ii) Increasing the areas of irrigation due to better water management
- (iii) Facilitating direct wage-earning to the landless and those dependent on wages as primary sources of income
- (iv) Sustaining and improving the capacity of land, vegetation, forest and biodiversity to provide ecosystem services

Broadly, direct benefits will accrue over three areas:

benefits from the protection of land, forests, agriculture and wasteland, improvement in livelihoods and wage income, and increase in carbon stocks in forests and other vegetation. The indirect benefits arising due to the multiplier effect of public expenditure, efficient utilization of natural resources, sustainability and reduction of stress in society is very difficult to account for, so only direct benefits have been estimated for this section.

Benefits due to avoidance of land degradation/reclamation of land:

The economic cost of land degradation requires both direct and indirect costs to be taken into consideration. The overall losses due to land degradation are because land gets converted from a higher value biome into a lower value biome. Globally, the Total Economic Value approach (TEV) has been used by researchers to arrive at the cost of land degradation. The TEV method will facilitate the accounting of losses of both direct and indirect ecosystem services. Further, the losses due to land degradation have both on-site and off-site dimensions. It has been estimated that only about 46% of the global cost of land degradation due to land use land cover change is borne by the land user, while 56% is borne by the users of the ecosystem services off the farm (Nkonya *et al.*, 2016). Estimating losses also encounter

challenges as some of the ecosystem services are not marketable, and therefore their price cannot be quantified.

The action points for implementing the SLEM roadmap impact key areas like addressing forest land degradation and improving their capacity to provide ecosystem services, including the capacity to sequester carbon, improvement in the net value of output from agriculture, horticulture, agroforestry and animal husbandry and increase in the net area under irrigation due to more efficient water use. However, the direct and indirect impacts of the recommendations in each domain will be difficult to quantify.

Even if we take a sectoral view, the total value of the output of the livestock sector in the country was Rs. 11,596 billion in 2018-19⁷⁹. The recommendation regarding the improvement of grasslands will largely benefit the livestock sector in addition to other ecosystem services made available to a larger set of beneficiaries. A total of Rs. 200 billion over 10 years has been allocated for the improvement of grasslands and grazing lands in the roadmap.

We may also take cues from the study by TERI (TERI, 2018), in which it has been estimated that the annual cost of land degradation and land use change is about 2.5% of India's GDP in 2014/15 and about 15.9% of the GVA from the agriculture, forestry and fishing sectors. The cost of land degradation in the year 2020, based on the GVA from the agriculture sector of Rs. 39,889 billion, can be estimated at Rs. 6,342 billion. In comparison, the financial impact of the roadmap is Rs. 2,605 billion over 10 years.

Benefits due to improvement of livelihoods and income:

The implementation of the roadmap's recommendations will also provide direct benefits to people in terms of wages and livelihoods as most of the interventions recommended in the roadmap will require human labour, which is estimated conservatively at 40% of the total expenditure. Thus, about 3.5 billion person-days of labour of value Rs. 1,000 billion will be produced during the 10 years. It does not include the improvement in livelihoods due to increase in productivity or output from land-based activities.

⁷⁹ <https://www.nddb.coop/information/stats/outputvalue>



Benefits due to an increase in carbon stock: Growth in carbon pool in forests will require addition both on account of increase in area as well as improvement in forest health. It will also be important to avoid losses from the pool due to further degradation of forest land and change in land use. The recommendations in the roadmap are expected to not only help in the addition of area under the green cover but also in avoiding losses. It will thus support the BAU in the timeline of 10-15 years. As argued earlier, even achieving increment in the forest carbon stock in the BAU scenario will require additional interventions beyond those committed at present.

To make the analysis simple, certain assumptions are made before arriving at a monetary value of the carbon stock created in forest and TOF due to the interventions recommended in the roadmap. We use 6% as the discount rate, between the 2% and 7% suggested in some publications for discounting benefits of climate change mitigation (Richard *et al.* 2001). The rate of carbon per tonne is assumed to be 30 USD per tonne (accepted by World Bank in 2016), increasing at 5% per year, to reflect a change in the currency, as well as an expected increase in the value of carbon, as the need to reduce global emissions becomes more urgent in the future⁸⁰.

The carbon addition rate in India's forests was 0.3% as per the ISFR, 2019 (FSI, 2019 b). With improved forest

management, restoration of degraded forest land and reduction in pressure on the forests, we assume the annual yield from India's forests will increase by 50% over the next 15 years. The increase will be gradual, with some lag after the interventions are implemented.

The growing stock in TOF has been varied over the last few years as evident from successive ISFRs from 2011 to 2019. However, a 2% increase in the growing stock net of harvesting has been assumed over the next 15 years. The growing stock in TOF is important as it is expected to be the main contributor to increasing the green cover in the future.

With the above assumptions, the present value of the carbon pool added in 15 years due to forest and tree cover after the start of interventions is estimated to be at Rs. 1,150 billion.

Fiscal Impact of the proposal: The total cost of implementing the roadmap is Rs. 2,605 billion over 10 years. The current annual Govt. of India contribution for SLEM related programmes is Rs. 576 billion. On an annual basis, the roadmap's budget impact will be 31% of the current allocation in such programmes and 0.74% of the overall budgetary allocation of the Central government. As far as the sectoral budgetary impact is concerned, the additional allocation required from the key ministries/sectors over 10 years is given in Table 33.

Table 35. Impact of recommendations of SLEM roadmap on sectoral budget

Sector	Cost of Roadmap (Rs. billion)	Increase over current allocation
Environment and Forests	1466	523%
Rural Development	930	7%
Others	209	-

⁸⁰ There are various prices of carbon accepted in different markets ranging from 139 USD/ Tonne (Sweden Carbon Tax) to 16 USD/ Tonne (EU ETS) (Skeates, Hannah, Innes, Andrews, 2018).



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Annexures





Major Environment Related Agreements (MEAs) Ratified by India

MEAs	Year	Entry into force	Date of ratification by India	Issues covered
Convention on Wetlands of International Importance	1971	21.12.1975	11.02.1982	Conservation and wise use of wetlands, primarily as habitat for the water-birds
Convention for the Protection of World Cultural and Natural Heritage	1972	17.12.1975	4.11.1977	Protection and conservation of cultural and natural heritage
Convention on International Trade in Endangered Species	1973	1.07.1975	20.07.1976	International trade in endangered species of wild fauna and flora
Convention on Migratory Species of Wild Animals (CMS)	1979	1.11.1983	01.11.1983	Conservation, management and wise use of migratory species of wild animals and their habitats
Convention for Protection of the Ozone Layer (Vienna)	1985	22.09.1988	18.03.1991	Protection of atmospheric ozone layer above the planetary boundary layer
Protocol on Substances that Deplete the Ozone Layer (Montreal)	1987	1.01.1989	19.06.1992	Protection of atmospheric ozone layer above the planetary boundary layer
Convention on Transboundary Movements of Hazardous Wastes and their Disposal (Basel)	1989	5.05.1992	24.06.1992	Regulation of transboundary movements of hazardous wastes and their disposal
United Nations Framework Convention on Climate Change (UNFCCC)	1992	21.03.1994	01.11.1993	Changes in the earth's climate system due to anthropogenic interference
Protocol to the UNFCCC (Kyoto)	1997	16.02.2005	26.08.2002	Quantified emission limitation and reduction commitments for Annex Parties
Convention on Biological Diversity (CBD)	1992	29.12.1993	18.02.1994	Biological diversity and biological resources
Protocol on Bio safety to the CBD (Cartagena)	2000	11.09.2003	11.09.2003	Regulation of transboundary movement, transit, handling and use of living modified organisms LMOs)



United Nations Convention to Combat Desertification	1994	26.12.1996	17.12.1996	Combating desertification and mitigate the effects of drought, particularly in Africa
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	1998	24.02.2004	24.05.2005	Promote shared responsibility and cooperative efforts among the Parties in the international trade of certain hazardous chemicals, in order to protect human health and the environment from potential harm and to contribute to their environmentally sound use
Stockholm Convention on Persistent Organic	2001	17.05.2004	13.01.2006	Protect human health and the environment from persistent organic pollutant
Nagoya Protocol	2010	12.10.2014	09.10.2012	Access and Benefit Sharing
Paris Agreement	2015	04.11.2016	02.10.2016	Binding agreement to limit climate change





History of Watershed Management in India

1973-74	Drought Prone Area Programme (DPAP) ⁸⁵	<ul style="list-style-type: none"> Minimise adverse effects of drought on crop production and livestock and productivity of land, water and human resources ultimately leading to drought proofing of affected areas. 	MoRD
1977-78	Desert Development Programme (DDP) ⁸⁶	<ul style="list-style-type: none"> Minimise the adverse effect of drought and control desertification through rejuvenation of natural resource base of identified desert areas. Achieve ecological balance in the long run. 	MoRD
1989-90	Integrated Wasteland Development Programme (IWDP) ⁸⁷	<ul style="list-style-type: none"> Wastelands development in non-forest areas for checking land degradation. Putting wastelands to sustainable use & increasing biomass availability especially that of fuelwood, fodder, fruits, fibre & small timber. 	MoRD
1990-91	National Watershed Development Project for Rainfed Areas (NWDPA) ⁸⁸	<ul style="list-style-type: none"> Conservation, development and sustainable management of natural resources. Enhancement of agricultural production and productivity in a sustainable manner. Reduction in a regional disparity between irrigated and rainfed areas. Creation of sustained employment opportunities for the rural community including the landless. 	Ministry of Agriculture (MoA)
1994	Hanumantha Rao Committee, 1994 Resulted in Guidelines for Watershed Development ⁸⁹	<ul style="list-style-type: none"> Provide common guidelines for Watershed Development Focused on participatory approaches Brought DDP, DPAP and the Integrated Wastelands Development Programme (IWDP) under a single umbrella Sought to leverage the success of NGOs 	MoRD
1999-2000	Watershed Development Fund ⁹⁰	<ul style="list-style-type: none"> Fund set up in 1999-2000 to replicate watershed activities in drought-prone areas across the country. Contribution of INR 100 crores each by Ministry of Agriculture (MoA), GoI and NABARD. Watershed Development projects in 100 priority districts 	MoA and NABARD

⁸⁵ <https://dolr.gov.in/drought-prone-areas-programme-dpap>⁸⁶ <https://dolr.gov.in/desert-development-programme-ddp>⁸⁷ <https://dolr.gov.in/integrated-wasteland-development-programme>⁸⁸ <http://agricoop.nic.in/sites/default/files/NWDPA8410.pdf>⁸⁹ <http://water.rajasthan.gov.in/content/dam/water/watershed-development-and-soil-conservation-department/Documents%20%26%20Library/common%20guideline%202008.pdf>⁹⁰ <https://www.nabard.org/content.aspx?id=470>



2001	Common Guidelines for Watershed Development (Revised) ⁸⁷	<ul style="list-style-type: none"> • 1994 guidelines were updated to adopt a more project-specific focus with greater flexibility in implementation. • Guidelines were applicable across watershed programmes- IWDP, DPAP, DDP, and other programs notified by GOI. • Well-defined role for State, District and Village level Institutions • Combination of GO/NGO as PIA, role of women • Exit Protocol created for watershed projects • SHGs integrated with Watershed programmes • Effective use of remote sensing data furnished by NRSA 	MoRD
2003	Hariyali Guidelines ⁸⁸	<ul style="list-style-type: none"> • District and Gram Panchayats involved more actively in the Implementation of watershed project • Community institutions were more meaningfully integrated with watershed projects, role for NGOs as PIA • Convergence with other Government programmes for wholistic development of programme areas. 	MoRD
2006	Parthasarathy Committee Report ⁸⁹ (committee to evaluate DPAP, DDP and IWDP)	<ul style="list-style-type: none"> • Highlighted the need to improve productivity of dryland farming to contribute to food security targets. • Recommended a greater focus on watershed development programmes to increase the productivity of lands in rain-fed areas to address food security. • Based on the report, DPAP, DDP and IWDP were integrated and consolidated into a single modified programme called Integrated Watershed Management Programme (IWMP) and launched in 2009-10. 	MoRD
2006	National Rainfed Area Authority (NRAA) ⁹⁰	<ul style="list-style-type: none"> • NRAA set up in 2006 with a mandate inter alia including: • prepare the perspective plan, outline National strategy and road map for holistic and sustainable development of rainfed farming areas. • evolves common guidelines for all schemes of different Ministries including the Externally aided project for the development of Rainfed/Dry land Farming Systems. • coordinate and bring convergence within and among agricultural and wasteland development programmes being implemented in rainfed areas of the country. • evaluate the effectiveness of completed watersheds and concurrent evaluation of on-going programmes. 	Planning Commission
2008	Common Guidelines for Watershed Development ⁹¹ (revised in 2011)	<ul style="list-style-type: none"> • Provided a fresh framework to guide all WSD projects in all departments and ministries. • Delegating Powers to States to sanction and oversee 	National Rainfed Area Authority (NRAA) and Planning Commission

⁸⁷ <http://megcnrd.gov.in/forms/wsd.pdf>

⁸⁸ http://megsoil.gov.in/docs/HARAYALI_Guidelines.pdf

⁸⁹ <https://dolr.gov.in/sites/default/files/Outcome%20Budget%202012-13.pdf>

⁹⁰ <http://www.nraa.gov.in/Mandate.aspx>

⁹¹ <https://dolr.gov.in/sites/default/files/CommonGuidelines2008.pdf>



		<p>implementation of watershed projects within their areas of jurisdiction.</p> <ul style="list-style-type: none">• Provisioned for dedicated Institutions for implementing agencies with multi-disciplinary professional teams at the National, state and District level.• Duration of the watershed programme enhanced in the range of 4 to 7 years depending upon the nature of activities being undertaken.• Livelihood orientation is given priority along with conservation measures.• Cluster approach of treating geo-hydrological units of an average size of 1,000 to 5,000 hectares• Emphasis on scientific planning emphasised and use of technology	
2009	Integrated Watershed Management Programme (IWMP)	<ul style="list-style-type: none">• IWMP initiated by merging DPAP, DDP and IWDP• These followed the Common Guidelines for Watershed Development, 2008.	MoRD
2015	Pradhan Mantri Krishi SinchaiYojna (PMKSY)	<ul style="list-style-type: none">• Scheme formulated to increase irrigation coverage and improve water use efficiency with end-to-end solution on source creation, distribution, management, field application and extension activities.• IWMP subsumed as one of the Components of PMKSY• Landscape-level approach through District Irrigation Plans (DIP)	PMSKY (Watershed) Department of Land Resources (DoLR)
2017-2022	World Bank Funded National Watershed Project ¹²	<ul style="list-style-type: none">• Technical Assistance project for supporting watersheds• Use of technology• Upscaling learnings• Strengthening of delivery institutions	DoLR, MoRD

¹² <https://dolr.gov.in/sites/default/files/Project%20Implementation%20Plan%20%28PIP%29.pdf>

Annexure-III

Budgetary Details of Ministry of Environment, Forest and Climate Change for Schemes Pertaining to SLEM

S. No.	Schemes	2016-17			2017-18			2018-19			2019-20		2020-21	
		Revised Budget	Actual Exp	Budget Utilization in %	Revised Budget	Actual Exp	Budget Utilization in %	Revised Budget	Actual Exp	Budget Utilization in %	Revised Budget	Actual Exp	Budget	Actual Exp
1	National Biodiversity Authority	18	18	98	20	19	93	20	19	95	20	...	23	...
2	National Tiger Conservation Authority	7	7	100	10	10	100	10	10	99	9	...	11	...
3	Green India Mission-National Afforestation Programme	98	101	103	127	127	99	159	176	111	179	...	246	...
4	Forest Fire Prevention and Management	...	45	...	45	35	77	50	47	93	47	...	50	...
5	Intensification of Forest Management	45	...	...	...	...	...	...	...	...	...	...	...	...
6	Project Tiger	365	342	94	345	345	100	350	323	92	283	...	300	...
7	Project Elephant	20	21	106	28	25	91	30	30	99	31	...	35	...
8	Integrated Development of Wildlife Habitats	90	90	99	150	149	99	165	165	100	175	...	148	...
9	Conservation of Corals and Mangroves	18	16	91	15	13	88	...	...	...	...	...	...	...
10	Biodiversity Conservation	22	21	95	11	9	82	15	13	90	9	...	13	...
11	Conservation of Aquatic Ecosystems	60	60	100	56	56	100	66	64	97	45	...	68	...
12	National River Conservation Programme	101	99	98	174	173	100	151	150	100	...	...	...	...
	Total	844	819	97	981	960	98	1015	996	98	798	0	894	0

Rs Crore (= 10 million)





Budgetary Details of Ministry of Agriculture and Farmer Welfare for Schemes Relevant to SLEM

S. No.	Schemes	2016-17			2017-18			2018-19			2019-20		2020-21	
		Revised Budget	Actual Exp	Budget Utilization in %	Revised Budget	Actual Exp	Budget Utilization in %	Revised Budget	Actual Exp	Budget Utilization in %	Revised Budget	Actual Exp	Budget	Actual Exp
1	Pradhan Mantri Krishi Sinchay Yojana (PMKSY)- Per Drop More Crop	1,990	1,991	100	3,000	2,819	94	2,955	2,918	99	2,032	...	4,000	...
2	National Project on Organic Farming	1	11	2192	10	...	...	3	3	110	2	...	13	...
3	National Project on Soil Health and Fertility	419	229	55	214	195	91	300	314	105	156	...	315	...
4	Rainfed Area Development and Climate Change	190	205	108	210	209	100	225	216	96	146	...	203	...
5	Paramparagal Krishi Vikas Yojana	120	153	127	250	203	81	300	329	110	299	...	500	...
6	National Project on Agro- Forestry	50	23	45	40	43	107	40	29	71	28	...	36	...
7	National Mission on Oil Seed and Oil Palm	376	328	87	328	264	80	352	341	97	...	...	...	...
8	National Mission on Horticulture	1,660	1,493	90	2,190	2,027	93	2,100	1,997	95	1,584	...	2,300	...
9	National Bamboo Mission	...	...	...	...	...	...	147	150	102	87	...	110	...
	Total	4,806	4,433	92	6,242	5,760	92	6,421	6,296	98	4,334	0	7,476	0

Rs Crore (= 10 million)

Annexure-V

Budgetary Details of Ministry of Environment, Forest and Climate Change for Schemes Pertaining to SLEM

S. No.	Schemes	2016-17			2017-18			2018-19			2019-20			2020-21	
		Revised Budget	Actual Exp	Budget Utilization in %	Revised Budget	Actual Exp	Budget Utilization in %	Revised Budget	Actual Exp	Budget Utilization in %	Revised Budget	Actual Exp	Budget	Actual Exp	
1	National River Conservation Programme	...	...	...	723	723	100	1,620	1,620	100	1,200	...	840	...
2	Namami Gange-National Ganga Plan	1,675	1,675	100	2,300	700	30	750	688	92	353	...	800	...	
3	National Water Mission	5	4	89	5	1	23	...	...	...	...	...	...	...
4	Ground Water Management and Regulation Scheme	115	112	98	275	254	93	260	260	100	243	...	275	...	
5	Accelerated Irrigation Benefit Programme	1,000	1,000	100	...	...	...	...	...	...	...	...	...	...
6	Har Khet Ko Pani	421	440	104	1,888	1,355	72	2,181	2,180	100	1,021	...	1,051	...	
7	Atal Bhujal Yojna	...	...	...	-	...	...	...	...	...	1	...	150	...
	Total	3,216	3,231	100	5,191	3,034	58	4,811	4,748	99	2,818	0	3,116	0	

Rs Crore (= 10 million)





Annexure-VI

Budgetary Details of Ministry of Rural Development for Schemes Pertaining to SLEM

S.No.	Schemes	2016 - 17			2017 - 18			2018 - 19			2019 - 20		
		RE	Actual Exp	Utilization	RE	Actual Exp	Utilization	RE	Actual Exp	Utilization	RE	Actual Exp	Utilization
1	Mahatma Gandhi National Rural Employment Guarantee Programme*	57,387	58,063	101%	64,986	63,649	98%	69,229	69,619	101%	75,510	68,263	90%
	MGNREGA NRM %		60.1			55.0			58.8			61.9	
	Exp on NRM		34,896			35,014			40,936			42,262	
2	Pradhan Mantri Kishi Sinchay Yojna - Integrated Watershed Development Programme	1,550	1,511	97%	1,722	1,671	97%	1,841	1,796	97%	1,838		
	Total on NRM works		36407			36685			42722				

Rs Crore (= 10 million)



Expenditure of State Forest Departments from 2015-16 to 2018-19

S. No.	States	Revenue Expenditure				Capital Expenditure				Total Expenditure			
		2015-16	2016-17	2017-18	2018-19	2015-16	2016-17	2017-18	2018-19	2015-16	2016-17	2017-18	2018-19
1	Jammu & Kashmir	59,320	59,384	60,705	82,958	6,257	5,608	5,802	4,788	65,577	64,992	66,507	87,746
2	Himachal Pradesh	40,424	41,256	40,285	44,006	942	667	741	1,116	41,366	41,923	41,026	45,122
3	Punjab	11,298	13,669	14,216	16,520	0	0	0	0	11,298	13,669	14,216	16,520
4	Haryana	30,634	26,492	28,662	27,109	0	0	0	0	30,634	26,492	28,662	27,109
5	Uttarakhand	43,961	43,973	55,460	61,770	10,060	10,094	5,787	3,946	54,021	54,067	61,247	65,716
6	Uttar Pradesh	52,932	56,002	61,956	64,073	33,431	72,740	23,679	21,697	86,363	1,28,742	85,634	85,770
7	Rajasthan	78,612	79,406	71,670	74,956	19,785	17,374	16,058	9,809	98,397	96,780	87,728	84,765
8	Gujarat	40,194	47,779	50,849	54,856	64,296	58,444	63,769	67,649	1,04,490	1,06,223	1,14,618	1,22,505
9	Madhya Pradesh	2,00,421	1,53,032	1,74,376	1,53,457	4,626	55,052	37,044	83,686	2,05,047	2,08,084	2,11,420	2,37,143
10	Chhattisgarh	1,10,523	1,03,074	1,16,209	1,01,820	1,913	1,679	2,009	2,054	1,12,436	1,04,753	1,18,218	1,03,873
11	Odisha	54,838	54,744	56,193	72,516	393	399	289	397	55,231	55,143	56,482	72,913
12	Bihar	26,991	29,567	25,335	31,477	1,267	3,609	938	3,112	28,258	33,176	26,272	34,589
13	Jharkhand	41,734	49,157	58,541	51,789	0	0	0	0	41,734	49,157	58,541	51,789
14	Assam	41,840	59,290	60,497	55,139	-30	0	2,508	4,123	41,810	59,290	63,005	59,262
15	Meghalaya	12,018	12,097	14,139	13,781	4	30	21	43	12,022	12,127	14,160	13,824
16	Arunachal Pradesh	22,491	23,273	21,532	27,036	0	42	0	170	22,491	23,315	21,532	27,206
17	Manipur	7,553	6,360	8,279	10,849	0	0	0	0	7,553	6,360	8,279	10,849
18	Mizoram	7,975	12,935	12,305	12,467	0	0	0	0	7,975	12,835	12,305	12,467
19	Tripura	9,440	8,312	10,341	11,746	5,000	4,500	796	1,014	14,440	12,812	11,137	12,760
20	Nagaland	6,716	7,709	11,575	10,207	50	27	430	44	6,766	7,736	12,005	10,251

Rs Lakh (= hundred thousand)



S. No.	States	Revenue Expenditure				Capital Expenditure				Total Expenditure			
		2015-16	2016-17	2017-18	2018-19	2015-16	2016-17	2017-18	2018-19	2015-16	2016-17	2017-18	2018-19
21	Sikkim	5,633	7,456	7,978	12,333	312	118	66	373	5,945	7,574	8,044	12,706
22	Telangana	39,414	43,078	48,884	27,243	7	953	997	21,720	39,421	44,031	49,881	48,964
23	Andhra Pradesh	27,190	26,691	33,195	28,270	2,408	140	135	6,324	29,588	26,831	33,329	34,593
24	Karnataka	1,38,685	1,44,170	1,90,057	1,62,850	1,197	5,203	1,000	1,682	1,39,882	1,49,373	1,91,057	1,64,533
25	Kerala	41,860	51,998	52,119	53,032	5,949	8,333	7,176	4,967	47,809	60,231	59,295	57,999
26	Tamil Nadu	28,996	28,059	32,453	36,180	11,381	9,670	16,162	12,134	40,377	37,729	48,614	48,314
27	Maharashtra	2,03,374	2,05,130	2,10,811	2,42,935	40,900	75,172	61,308	1,38,526	2,44,274	2,80,302	2,72,119	3,81,461
28	Goa	4,915	4,440	5,470	5,732	17	1,782	300	1,442	4,932	6,222	5,770	7,174
29	West Bengal	48,272	52,654	47,636	59,736	1,053	945	2,488	755	49,325	53,599	50,125	60,491
	Total	14,38,254	14,50,987	15,81,723	16,06,843	2,11,218	3,32,581	2,49,502	3,91,572	16,49,472	17,83,568	18,31,225	19,98,415

Rs Lakh (= hundred thousand)



Annexure-VIII

Expenditure of States on Soil and Water Conservation Activities 2015-16 to 2018-19

S. No.	States	Revenue Expenditure			Capital Expenditure			Total Expenditure					
		2015-16	2016-17	2017-18	2018-19	2015-16	2016-17	2017-18	2018-19	2015-16	2016-17	2017-18	2018-19
1	Jammu & Kashmir	6,470	6,344	6,165	9,140	1,253	588	622	832	7,723	6,932	6,787	9,973
2	Himachal Pradesh	4,300	6,052	6,873	6,633	2,880	3,090	2,670	3,492	7,190	9,142	9,543	10,126
3	Punjab	12,052	13,269	8,137	9,941					12,052	13,269	8,137	9,941
4	Haryana	5,272	5,886	7,551	8,177					5,272	5,886	7,551	8,177
5	Uttarakhand												
6	Uttar Pradesh	64,791	63,457	59,626	64,806	120	1,079	2	268	64,911	64,536	59,628	65,075
7	Rajasthan	6,673	6,461	6,225	7,001	39	24			6,712	6,485	6,225	7,001
8	Gujarat	17,334	21,369	27,686	4,528	11,157	8,948	9,672	116	28,491	30,317	37,358	4,644
9	Madhya Pradesh	5,751	5,765	6,266	6,695					5,751	5,765	6,266	6,695
10	Chhattisgarh	4,202	12,281	12,410	12,682	1,963	1,937	1,991	1,781	6,165	14,218	14,401	14,463
11	Odisha	23,379	27,706	31,613	32,439					23,379	27,706	31,613	32,439
12	Bihar	2,944	8,314	6,868	11,905	1,000				3,944	8,314	6,868	11,905
13	Jharkhand	2,894	6,293	11,315	10,289	3,497	42,801	29,916	26,041	6,391	49,094	41,231	36,330
14	Assam	6,547	8,701	7,951	9,531	350	492	8,107	8,928	6,897	9,193	16,059	18,459
15	Meghalaya	8,224	12,821	7,739	9,915					8,224	12,821	7,739	9,915
16	Arunachal Pradesh	5,604	6,157	7,447	6,318	69				5,673	6,157	7,447	6,318
17	Manipur	4,597	3,993	3,722	3,543			100	50	4,597	3,993	3,822	3,593
18	Mizoram	2,156	1,901	1,807	2,427			288	793	2,156	1,901	2,095	3,220
19	Tripura	806	762	908	1,885					806	762	908	1,885

Rs Lakh (= hundred thousand)



S. No.	States	Revenue Expenditure				Capital Expenditure				Total Expenditure			
		2015-16	2016-17	2017-18	2018-19	2015-16	2016-17	2017-18	2018-19	2015-16	2016-17	2017-18	2018-19
20	Nagaland	4,017	5,412	4,112	6,071	20	18	18	118	4,037	5,430	4,129	6,189
21	Sikkim	1,421	849	948	1,227					1,421	849	948	1,227
22	Telangana	5,460	5,505	8,070	4,597					5,460	5,505	8,070	4,597
23	Andhra Pradesh	2,904	3,448	3,964	3,617				1,412	2,904	3,448	3,964	5,029
24	Karnataka	36,167	42,578	52,679	41,373					36,167	42,578	52,679	41,373
25	Kerala	9,255	11,215	11,710	9,371	6,816	8,333	9,281	9,815	16,071	19,548	20,991	19,186
26	Tamil Nadu	9,688	10,581	12,209	14,576	1,614	1,678	1,866	3,220	11,302	12,259	14,075	17,796
27	Maharashtra	6,067	10,065	7,720	33,552	1,69,798	1,16,657	2,24,373	2,23,536	1,75,865	1,26,722	2,32,093	2,57,088
28	Goa	198	206	233	255	770	274	161	1,290	968	480	394	1,544
29	West Bengal	5,022	7,241	5,813	11,229				41	5,022	7,241	5,813	11,269
Total		2,64,195	3,14,632	3,27,766	3,43,722	2,01,356	1,85,919	2,89,066	2,81,733	4,65,551	5,00,551	6,16,832	6,25,456

Rs Lakh (= hundred thousand)



Details of Forest Land Diverted under Forest Conservation Act, 1980

S. No.	State	Total FCA Projects	Total Land Diverted (In Ha.)	Total Demand from UA (In Ha)	Head-wise Breakup of Demand from User Agencies (In Ha)							
					NPV	CA	ACA	PCA	PAF	CAT	SZ	Others
1	Uttarakhand	4,647	71,255	53,858	36,115	5,452	139	2,480	-	9	3	9,659
2	Punjab	4,379	80,452	39	13	20	2	1	1	2	-	-
3	Haryana	3,867	17,979	38,647	16,058	17,821	916	938	103	274	11	2,526
4	Gujarat	2,263	93,034	6,269	2,965	2,971	0	-	-	48	-	285
5	Himachal Pradesh	2,022	21,222	44,223	23,098	5,775	0	14,821	-	86	5	438
6	Madhya Pradesh	1,817	2,73,966	1,22,536	66,206	42,418	69	2,601	1,209	656	1,260	8,117
7	Uttar Pradesh	1,065	62,884	43,370	9,670	9,759	9	3	-	30	-	23,900
8	Karnataka	1,016	1,08,751	4,07,448	70,641	7,879	-	1,087	-	407	56	3,27,378
9	Rajasthan	891	48,503	8,957	6,448	1,546	44	3	-	472	92	353
10	Maharashtra	852	39,722	67,768	43,770	12,460	909	5,305	-	2,159	69	3,096
11	Andhra Pradesh	781	68,275	52,969	39,858	8,857	78	2,774	18	415	213	755
12	Tamil Nadu	680	6,975	5,722	2,965	1,808	6	-	-	54	93	797
13	Odisha	646	78,538	4,69,127	3,71,368	23,248	2,792	5,090	5	3,900	1,961	60,763
14	Sikkim	472	4,036	12,793	6,899	4,523	2	-	-	1,197	-	173
15	Arunachal Pradesh	464	3,41,109	42,649	21,091	21,279	-	-	-	-	-	279
16	Chhattisgarh	430	52,413	1,14,718	87,604	21,906	2,231	301	-	373	235	2,069
17	Jharkhand	422	38,229	10,146	8,658	1,279	-	-	-	-	21	188
18	Tripura	409	8,208	13,068	9,125	3,395	13	-	-	15	45	476
19	Assam	332	10,531	19,577	14,888	2,397	-	-	80	4	8	2,200
20	Bihar	321	8,781	45,917	9,962	33,537	15	230	-	53	-	2,119
21	Telangana	315	57,217	-	-	-	-	-	-	-	-	-
22	Kerala	244	41,427	-	-	-	-	-	-	-	-	-
23	Dadra Nagar Haveli	149	274	-	-	-	-	-	-	-	-	-
24	West Bengal	122	7,916	-	-	-	-	-	-	-	-	-



S. No.	State	Total FCA Projects	Total Land Diverted (In Ha.)	Total Demand from UA (In Ha)	Head-wise Breakup of Demand from User Agencies (In Ha)									
					NPV	CA	ACA	PCA	PAF	CAT	SZ	Others		
25	Andaman Nicobar Islands	120	2,630	-	-	-	-	-	-	-	-	-	-	-
26	Meghalaya	103	793	-	-	-	-	-	-	-	-	-	-	-
27	Goa	100	2,749	-	-	-	-	-	-	-	-	-	-	-
28	Manipur	43	3,760	-	-	-	-	-	-	-	-	-	-	-
29	Chandigarh	43	130	1,182	401	782	-	-	-	-	-	-	-	-
30	Mizoram	38	11,252	45	11	30	1	1	0	0	0	1	1	1
31	Delhi	23	106	-	-	-	-	-	-	-	-	-	-	-
32	Jammu and Kashmir	7	656	-	-	-	-	-	-	-	-	-	-	-
33	Daman Diu	1	4	-	-	-	-	-	-	-	-	-	-	-
34	Lakshadweep	-	-	-	-	-	-	-	-	-	-	-	-	-
35	Nagaland	-	-	-	-	-	-	-	-	-	-	-	-	-
36	Pondicherry	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		29,084	15,63,775	15,81,025	8,47,812	2,29,141	7,225	35,633	1,416	10,154	4,073	4,45,571		



Annexure-X

MSDG Indicators under National Indicator Framework Relevant to SLEM

Target	National Indicator	Data Source	Periodicity
Goals 1. End poverty in all its forms everywhere			
1.1 By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than \$1.25 a day	1.1.1 Proportion of population living below the national poverty line, (in percentage)	NITI Aayog	5 Years
1.3 Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable	1.3.3 Persons provided employment as a percentage of persons who demanded employment under Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) Ministry of Rural Development Annual	National Bank for Agriculture and Rural Development (NABARD)	Annual
	1.3.4 Number of Self-Help Groups (SHGs) provided bank credit linkage, (in lakhs)		
1.4 By 2030, ensure that all men and women, the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance	1.4.1 Percentage of Population getting safe and adequate through Pipe Water Supply (PWS) (similar to 6.1.1)	Ministry of Jal Shakti, DWS for Rural and MIS, NSS, Ministry of Statistics and PI for Urban	Annual for Rural and 3 Years for Urban
	1.4.2 Proportion of population (Urban) living in households with access to safe drinking water & sanitation (Toilets)	MIS, NSS, Ministry of Statistics and Programme Implementation	3 years
	1.4.7 Proportion of households having access to toilet facility (Urban & Rural) (in percentage) (similar to 6.2.1)	Ministry of Jal Shakti, DWS for rural and MIS, NSS, Ministry of Statistics and PI for Urban	Annual for Rural and 3 years for Urban



Target	National Indicator	Data Source	Periodicity
1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters	1.5.2 Proportion of States that adopt and implement local disaster risk reduction strategies in line with national disaster reduction strategies, (similar to 11.b.2)	Ministry of Home Affairs	Annual
1.b Create sound policy frameworks at the national, regional and international levels, based on pro-poor and gender-sensitive development strategies, to support accelerated investment in poverty eradication actions	1.b.1 Proportion of budget earmarked under gender budget	Ministry of Women and Child Development	Annual
Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture			
2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-	2.3.1 Agriculture productivity of wheat and rice, (in kg per hectare)	Ministry of Agriculture and Farmers Welfare (MoA&FW)	Annual
	2.3.2 Gross Value Added in agriculture per worker, (in Rs.)	DES, Agriculture Statistics Division, Ministry of Agriculture and Farmers Welfare	Annual
2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	2.4.1 Proportion of Net Sown Area to Cultivable land, (in percentage)	DES, Agriculture Statistics Division, Ministry of Agriculture and Farmers Welfare	Annual
	2.4.2 Percentage of farmers issued Soil Health Card	DES, Agriculture Statistics Division, Ministry of Agriculture and Farmers Welfare	Annual
	2.4.3 Percentage of net area under organic farming	Ministry of Agriculture and Farmers Welfare (MoA&FW)	Annual
Goal 5: Achieve gender equality and empower all women and girls			
5.a Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land	5.a.1 Operational land holdings (Female operated operational Holdings)	Department of Agriculture, Cooperation and Farmer Welfare, Ministry of Agriculture and Farmers Welfare	5 Years



and other forms of property, financial services, inheritance and natural resources, in accordance with national laws			
	5.a.5 Exclusive women SHGs in Bank linked SHGs, (in percentage)	National Bank for Agriculture and Rural Development	Annual
Goal 12. Ensure sustainable consumption and production patterns			
12.2 By 2030, achieve the sustainable management and efficient	12.2.1 Percentage variation in per capita use of natural resources	Ministry of Statistics and Programme Implementation	Annual
12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse	12.4.2 Development of National Policy for environmentally sound management of hazardous chemical and waste	Ministry of Environment Forest and Climate Change (MoEFCC)	Annual
12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	12.5.1 Number of waste recycling plants installed	Ministry of Housing and Urban Affairs	Annual
	12.5.2 Number of municipal corporations using waste segregation techniques	Ministry of Housing and Urban Affairs	Annual
	12.5.3 Number of municipal corporations banning single use plastic	Ministry of Housing and Urban Affairs	Annual
Goal 13. Take urgent action to combat climate change and its impacts			
13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	13.1.1 Number of States with strategies for enhancing adaptive capacity and dealing with climate extreme weather events	Ministry of Environment Forest and Climate Change (MoEFCC)	Annual
13.2 Integrate climate change measures into national policies, strategies and planning	13.2.1 Pre-2020 action: Achievement of pre-2020 goals as per country priority (percentage reduction in emission intensity of GDP, over 2005 level)	Ministry of Environment Forest and Climate Change (MoEFCC)	2 years
	13.2.2 Achievement of Nationally Determined Contribution (NDC) Goals in post 2020 period	Ministry of Environment Forest and Climate Change (MoEFCC)	Annual



Target	National Indicator	Data Source	Periodicity
Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development			
14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution	14.1.3 Percentage use of nitrogenous fertilizer to total fertilizer (N, P & K)	DAC&FW, Ministry of Agriculture and Farmer's Welfare	Annual
14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans	14.2.1 Percentage change in area under mangroves, (similar to 14.5.2)	Ministry of Environment Forest and Climate Change (MoEFCC)	2 Years
14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels	14.3.1 Average marine acidity (pH) measured at agreed site of representative sampling stations	Ministry of Earth Sciences	Annual
14.5 By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information	14.5.2 Percentage change in area under mangroves, (similar to 14.2.1)	Ministry of Environment Forest and Climate Change (MoEFCC)	2 Years
Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss			
15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and dry lands, in line with obligations under international agreements	15.1.1 Forest cover as a percentage of total geographical area, (in percentage)	Ministry of Environment Forest and Climate Change (MoEFCC)	2 Years
	15.1.2 Protected area as percentage of total geographical area	Ministry of Environment Forest and Climate Change (MoEFCC)	2 Years
	15.1.3 Area of Ramsar sites as a percentage to the total wetland area, (in percentage)	Ministry of Environment Forest and Climate Change (MoEFCC)	Annual
15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore	15.2.1 Percentage change in Forest Cover	Ministry of Environment Forest and Climate Change (MoEFCC)	2 Years
	15.2.2 Total area covered under different afforestation schemes (in Hectare)	Ministry of Statistics and Programme Implementation	Annual



degraded forests and substantially increase afforestation and reforestation globally	15.2.3 Tree cover as percentage of total geographical area	Ministry of Environment Forest and Climate Change (MoEFCC)	2 Years
15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world	15.3.1 Proportion of land that is degraded over total land area	National Remote Sensing Centre (NRSC), Dept. of Space	5 Years
15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development	15.4.1 Percentage change in forest cover in hill districts	Ministry of Environment Forest and Climate Change (MoEFCC)	2 Years
	15.4.4 Percentage change in per capita income of Himalayan States over previous year	National Accounts Division, NSO, MoSPI	Annual
15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species	15.5.1 Red List Index	Ministry of Environment Forest and Climate Change (MoEFCC)	Annual
15.6 Promote fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed	15.6.1 Number of Access and Benefit Sharing (ABS) agreements signed	Ministry of Environment Forest and Climate Change (MoEFCC)	Annual
15.7 Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products	15.7.1 Number of cases registered under the Wildlife Protection Act, 1972 (similar to 15.c.1)	Ministry of Environment Forest and Climate Change (MoEFCC)	Annual
15.8 By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species	15.8.1 Percentage change in prevention and control of invasive alien species	Ministry of Environment Forest and Climate Change (MoEFCC)	Annual



Target	National Indicator	Data Source	Periodicity
15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts	15.9.1 (a) Progress towards national targets established in accordance with Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011-2020. (b) Integration of biodiversity into national accounting and reporting systems, defined as implementation of the System of Environmental-Economic Accounting	Ministry of Statistics and Programme Implementation	Annual
15.a Mobilize and significantly increase financial resources from all sources to conserve and sustainably use biodiversity and ecosystems	National Indicator is under development		
15.b Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation	15.b.1 Percentage of government spending on environmental protection to total government expenditure	National Accounts Division, NSO, MoSPI	Annual
15.c Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities	15.c.1 Number of cases registered under the Wildlife Protection Act, 1972 (similar to 15.7.1)	Ministry of Environment Forest and Climate Change (MoEFCC)	Annual



Annexure-XI

Changes in Protected Areas in the Country

Year	2014	2015	2016	2017	2018	2019	Change between 2014-2019
No. of National Parks	103	103	103	103	104	101	-2
Area Under National Parks (km ²)	40500.13	40500.13	40500.13	40500.13	40501.13	40,564.03	63.9
No. of Wildlife Sanctuaries	535	541	543	544	544	553	18
Area Under Wildlife Sanctuaries (km ²)	118290.66	118866.44	118917.71	118931.8	118931.8	1,19,756.97	1466.31
No. of Community Reserves	43	44	45	46	46	163	120
Area Under Community Reserves (km ²)	58.22	59.51	59.66	72.61	72.61	833.34	775.12
No. of Conservation Reserves	64	71	72	76	77	86	22
Area Under Conservation Reserves (km ²)	2232.61	2548.82	2566.2	2587.95	2594.03	3,858.25	1625.64
No. of Protected Areas	745	759	763	769	771	903	158
Total Area under Protected Areas (km ²)	161081.62	161974.9	162043.7	162092.49	162099.47	1,65,012.59	3930.97

Source: National Wildlife Database, Wildlife Institute of India



SLEM Baseline Recommendations and Preliminary Analysis

The SLEM baseline report was published in 2014 by ICFRE. In the interim, progress on integrating some of the recommendations in the policies and institutional framework, either at the state or national level have been made. In this section, the current status of the recommendation has been discussed.

- **Common Categorisation of Land at National Level:** Nine Land use categories are defined by the revenue department (and updated by the patwari at the village level) namely forests, barren and wastelands, land put to non-agricultural use, area under permanent pasture and grazing land, area under miscellaneous tree crops and groves (not included in net sown area), culturable wasteland, current fallow and fallow other than current fallow.
 - The National Remote Sensing Centre (NRSC) uses a more comprehensive set of 24 categories for classifying Land Use Land Cover (LULS). Further NRSC has defined eight categories of land degradation (2015) and 12 categories of wastelands. An online geo platform where the different thematic layers for all states of the country is available can be accessed by common citizens³³.
 - The different states in India have also undertaken the process of digitisation of land records and by July 2020, nearly 90 percent of the records have been digitised by the states³⁴.
 - While the digitisation of land records brings in greater transparency, it still does not address the challenges of having an archaic land records system at the field level which is often the source of government data related to land use, cropping and ownership. The use of mobile based IoT or AI based solution can be used to address operational field level challenges at the patwari level while capturing updated land use data in line with the scientific rigour prescribed by NSRC. This will result in common land use categories across departments and sectors.
 - Interactions with different stakeholders, brought to light the practical challenges of addressing issues of common land. The village commons are shrinking rapidly due to encroachments and "pattas" being issued to poor households. Fragmentation of land and changes in ownership from common to private presents challenges on treating it on an ecosystem-based approach.
 - The idea of revival of State Land Use Boards or other authority for Land Use planning has not been found feasible due to inherent issues in planned allocation of land for different purposes like urban areas, industries etc.
- **Adopting an Ecosystem Management Approach to Land Management:** The ecosystem management approach to land management has gained wider acceptance in the country. Project following the Ecosystem based approach are being implemented in many states, namely Himachal Pradesh, Madhya Pradesh, Chhattisgarh, Telangana, Bihar, Sikkim and Kerala, to name a few. Most of these projects are funded by bilateral (GIZ, USAID) or multilateral donors (WB).
 - Maintenance and Enhancement of Ecosystem based services find a mention in the Chapter 2: Objectives and Other Essentials of Forest Management Planning of the National Working Plan Code -2014.³⁵, the code being the basis for preparing the working plan of a forest division. However, the Code stops short of explaining exactly the what would constitute an Ecosystem Based Approach to forest management. Watershed activities are implemented on the "ridge to valley approach". Many of the central government projects have incorporated the

³³ <https://bhuvan-app1.nrsc.gov.in/thematic/thematic/index.php>

³⁴ <https://economictimes.indiatimes.com/news/politics-and-nation/land-records-digitalised-in-more-than-90-per-cent-of-the-states-centre/articleshow/77288754.cms>

³⁵ http://www.indiaenvironmentportal.org.in/files/file/National%20Working%20Plan%20Code%202014_0.pdf



watershed approach in implementation. The Green India Mission also stresses on ecosystem-based management interventions.

- The National Action Plan on Climate Change provided a framework for integrating Ecosystem based Adaptation practices in State level sectoral plans and all States and Union territories had prepared the first set of State Action Plan on Climate Change. From 2018 onwards, many states have prepared the draft SAPCC. Ecosystem based adaptation practices are getting mainstreamed in sectoral planning in climate sensitive sectors.
- Further, In Madhya Pradesh, the process of preparing district level plans incorporating climate actions has been initiated. Climate Actions and more specifically ecosystem-based adaptation actions are getting integrated systematically in the planning process. This system may be studied in further detail for replication in other states in the country level.
- Stakeholder interactions however brought to light certain challenges in adopting an ecosystem based or watershed-based approach. Being an approach that requires multi stakeholder engagement, different department needs to work together in a coordinated manner to bring about the changes in a given landscape. The intersectoral coordination between forest and rural development departments was shared as a major challenge in watershed projects in Madhya Pradesh.
- Ecosystem Based approaches also involve participatory planning with local communities. This raises the expectation of the community. However, externally funded projects are of limited duration and due to slower rollout in initial years, the implementation phase gets squeezed, impacting both quality and outreach. Further, there are delays in deploying technical support well in time and in fund releases. Sometimes programmes are unable to cover all the villages leading to disappointment and negativity among community members.
- **Harmonization of State Legal Framework with the Provisions of PESA:** Harmonization of laws with PESA was taken up an important agenda by the Ministry of Tribal Affairs in the period 2011 to 2013. However, limited progress has been achieved in this regard. Ownership of minor forest produce grant of concessions and mining leases, exercise control over institutions and functionaries in all social sectors, etc. have especially been sensitive areas and by a large the tendency has been to continue the status quo. Many states are yet to notify PESA Rules, while some states are yet to put in place mechanism for implementation after notification of Rules.

Indian Institute of Public Administration, in 2016-17⁹⁸ studied the harmonisation of the state laws with PESA in three states, Jharkhand, Chhattisgarh and Odisha. The study brought forth the following results:

- Status of implementation is inconsistent and is lacking uniformity across the states. In some states, most of the PESA provisions have not been incorporated into state laws.
- In Jharkhand, a number of important provisions related to land acquisition, granting of prospecting license for mining, etc. have not been incorporated.
- Chhattisgarh has incorporated most of the provisions either into its Panchayat laws or subject laws, but it is yet to frame laws according to PESA on ownership of minor forest produce.
- Concerning the dispute resolution, it is observed that in Jharkhand and Odisha, the provision has been added, but it has been made subject to any laws made by the state legislature.
- Panchayats are elected, but the decisions of the Panchayat and the Gram Sabha get overlooked.
- The contradiction with subject to laws in matters of Minor Forest Produce (MFP), land acquisition, regulation of intoxication, also makes PESA a challenge.

⁹⁸ <https://ncst.nic.in/sites/default/files/2017/Presentation/1393.pdf>



- **Protected Area Management an Effective Way to Sustain Natural Resources:** Significant progress has been made under this recommendation since 2014. A total of 158 protected areas and an area of 3930 Km² have been added between 2014 and 2019. Between the SLEM baseline report (published in 2014) and December 2019, there has been an addition of 18 wildlife sanctuaries, 122 community reserves and 22 conservation reserves in the country. Area under wildlife sanctuaries have recorded the highest increase of 1466.31sq. Km.

As of December 2019, Protected Areas were 5.02% of the total geographic area of the country. The status of Protected Areas⁹⁷ as of December 2019 is detailed in the table below.

	No.	Total Area (km ²)	Coverage % of Country
National Parks (NPs)	101	40,564.03	1.23
Wildlife Sanctuaries (WLSs)	553	119,756.97	3.64
Conservation Reserves (CRs)	86	3,858.25	0.12
Community Reserves	163	833.34	0.03
Protected Areas (PAs)	903	1,65,012.59	5.02

While achieving 10 % of the total geographic area is a daunting task, there has been progress in adding the number of Protected Areas in the country and in increasing the area under PAs. However, new challenges have emerged. Estimation of population of flag ship species of wild fauna have shown encouraging signs in increase in population, however increasing human wildlife conflicts and challenges in maintaining functional corridors between populations to enable gene flow are posing major challenges. Another challenge is management of PAs which spread over non-forest areas in the possession of non-forest departments.

- **Mainstreaming biodiversity conservation for enhancing ecosystem services:** Biodiversity conservation has been a focus of bilateral funded forestry projects in many states, specially JICA funded projects. In addition to externally funded projects, Biodiversity Conservation and Development is an integral part of the National Forest Working Code 2104.
 - Biodiversity conservation is also an important strategy in the state action plans on climate change being prepared by the states. The strategies and actions not only focus on forest biodiversity but promote agriculture crop diversity as a coping strategy against climate change.
 - State Biodiversity Boards are functional, and BMC have been formed in many states but there are variations in capacity and functioning. In 2019, India published its report on *Implementation of India's National Biodiversity Action Plan An Overview 2019*⁹⁸. The report is comprehensive and details on the linkages of the National Biodiversity targets with the Ecosystems.
 - However, the State Biodiversity Boards have remained largely institutions with weak capacity and resources. Similarly, the BMCs have also not taken off in the true sense. Although start has been made in implementation of the ABS provisions of the BD Act, the benefits collected so far have been meagre compared to the value of commerce taking place related to bioresources.
 - Valuation of Ecosystem Services is still an area of ambiguity, with major institutions having yet not accepted pricing of ecosystem services into cost of projects based on natural resources. There has been progress at the national level though with the Fifteenth Finance Commission including forests and ecology as one of the factors in allocating funds to the states. However, the percolation of these concepts to project level is work in progress. Value pricing of water could be the starting point in putting payment of ecosystem services into motion.

⁹⁷ http://www.wiienviis.nic.in/Database/Protected_Area_854.aspx

⁹⁸ <http://nbaindia.org/uploaded/pdf/IndiaNationalBiodiversityActionPlan2019.pdf>



- **Inter-sectoral policies for long term biodiversity conservation:** There has been harmony observed at the policy level in most of the major policies which speak about the need for environment protection or conservation, biodiversity concerns and safeguards, and involvement of people. For example, *the Implementation of India's National Biodiversity Action Plan An Overview 2019* does mention on numerous different thematic policies and sectors, National Mineral Policy 2019 does mention the need to conserve biodiversity in areas being mined, etc. However, challenges at implementation level remain, mostly because agencies work in silos keeping limited to their core mandate and also because implementing policy objectives related to environmental conservation requires pricing in the cost of conservation in the respective projects, for which there is gap in policy as well as mandatory regulations.

- **Management of groundwater:** Due to overexploitation, largely for irrigation purposes, groundwater levels are falling perilously across many parts of the country and is a reason for major concern. According to the Economic Survey 2015-16, the current usage of groundwater has led to decline of water table at the rate of 0.3 metres per year in India⁸⁸.

The nexus of ground water depletion and power tariffs is well known. Not much work has happened in the field of pricing ground water, over and above the cost of extraction. There are views expressed in various studies that a water market and tariff policy can become an instrument to help conserve ground water.

Many states have come out with a State Water Policy where a section is dedicated to groundwater. However, most of the measures are focussed on recharge measures while the politically sensitive issue of power tariffs or water pricing is not dealt with the detail it deserves.

- **Smart land management and innovative technology for enhanced sustainable productivity:** Since the launch of the Soil Health Card Scheme in 2015, 11.74 crore farmers have been covered under the scheme. The farmers are educated to apply fertilisers as per the recommendations of the soil testing undertaken in the farmer's field and recorded in the soil health card. The scheme is very useful for addressing the challenge of soil health critical for farming operations.

Nutrient based fertilizer subsidy has been initiated which is a step in the right direction to correct the optimal NPK ration in the soil.

- **Enhanced ecosystem services to combat climate change:** As mentioned earlier enhanced ecosystem services for combating climate change is being implemented in many landscape-based pilots projects in the country through external funding. However, the scaling up of such projects at the National level continues to be a challenge mainly due to high level of engagement for intersectoral coordination and pricing of ecosystem services.

Some larger questions in case of water is being discussed, for example regarding how much charge water a user should pay to those protecting or giving away convenience for protection of land and forests in watershed areas in the river basin? Such questions at the moment are being attempted to be answered at a larger scale within governance structures, but the discourse has still not reached the level involving individuals and thus has had limited or no effect on individual behaviour at both ends.

- **Developing a National Land Use Policy:** The idea of the policy was to use land as per its most optimal use and land productivity class and create zones for various types of uses. But land being a State subject, developing a National Land Use policy was not considered a feasible option and has remained an unfinished agenda of the government. This is also due to the fact that land is a critical resource in short supply and with many competing demands. However, there are some examples from states worth studying.

Mizoram in 2015 brought out a New Land Use Policy with an objective of developing and giving all farmers in the state suitable, permanent and stable tenures. The Policy also aims to give all the village farmers self-sufficiency in rice, vegetables etc. and give them help in monetary terms with necessary guidance.

⁸⁸ <https://www.indiatoday.in/india/story/who-is-guzzling-india-s-drinking-water-1560411-2019-07-03>



In 2019, Tamil Nadu also brought out a draft Land Use Policy¹⁰⁰ to replace an earlier policy that was coming to an end. The policy aims to provide a strategic framework for spatial integration of environmental, economic, social development initiatives in Tamil Nadu at all levels of governance, with a view to achieving sustainable growth, equitable access to resources and conflict-free land use management.

- **Assessing severity of land degradation:** Currently ISRO (SAC and NRSC) are the organisations which are monitoring Land degradation by using different criteria. The capacity to undertake the same exercise at the state level is not available with any agency. Government is considering establishing a Centre of Excellence for Sustainable Land Management (CoE). This task can be taken up by the CoE in the near future as a part of its mandate.
- **Women Farmers:** Although the statute provides land rights to the women farmers, the social structure and property rights in a patriarchal order deprive women of ownership rights over household land. In the absence of land rights, women headed households undergo numerous hardships in accessing credit and inputs as accessing these require proof of land ownership. Women are deprived of land rights due to social and economic reasons and it is not simply be a matter of registration of women as owners of land. Action beyond registration of property may be required in future.
- **Developing an online National Indicator Framework:** The Ministry of Statistics and Programme Implementation, Government of India and NITI Aayog have developed many monitoring frameworks for a number of the Indicators under the National Indicator Framework on SDG are pertinent for monitoring SLEM. The upcoming Centre of Excellence on Land Degradation is mandated with the task of preparing a national level dashboard on monitoring progress under SLEM.

Going beyond the preparation of the National Framework, it is imperative that corresponding monitoring structures are developed at the state and district level for data collection and reporting.

¹⁰⁰ http://upm.urban-industrial.in/live/hrdpmp/hrdpmaster/lgep/content/e65513/e65664/e66028/e69395/03_TNSLUPP.pdf



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